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JOURNAL
OF THE
Royal
United Service Institution,
WHITEHALL YARD.

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.

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VOL. XXXIII.



LONDON:
PUBLISHED BY W. MITCHELL AND CO.,
CRAIG'S COURT, CHARING CROSS,
NEAR THE ADMIRALTY AND HORSE GUARDS,
WHITEHALL.

1889-90.

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“The Tactical Operations of the Future (including questions of Supply and Transport of Ammunition) as affected by the introduction of Magazine Rifles, Machine and Quick-firing Guns, and Smokeless Powder.”

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The Journal

OF THE

Royal United Service Institution.

VOL. XXXIII.

1889.

No. 147.

Friday, January 18, 1889.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B.,
G.C.M.G., Adjutant-General to the Forces, in the Chair.

QUICK-FIRING¹ GUNS FOR FORTRESS DEFENCE.

By Captain F. GLEADOWE STONE, P.S.C., R.A. (Instructor of Fortification R.M. College; Royal Art. Inst. Prize Medallist, 1888).

THE defence of fortresses may be divided into that of sea-fronts and land-fronts; as a maritime nation and great naval Power, we are more immediately interested in the former.

It is a generally accepted principle in adopting any particular line of defence, to be guided by the resources and probable plan of attack of one's adversary—the resources of our enemies are probably as well known to us as ours are to them; but as regards a probable plan of attack upon any of our fortresses or coaling stations, there seems to be a wide divergence of opinion. A writer in the "Edinburgh Review" says: "The tactical condition of the 'battle fleet' is such, that giving the ships to an Admiral to arrange in fighting order, must be something like giving boiled eggs to a cook to make an omelette of."²

The question is, indeed, of so complicated and difficult a nature that the gold medal of this Institution for 1888, for the best essay on the subject, was not awarded; I trust, therefore, that I, as a layman, may be pardoned if I avoid plunging deeply into waters which naval experts have as yet scarcely fathomed.

In naval strategy we also find a divergence of views, though in this latter case we have more solid data to go upon. It has been argued by Admiral Colomb that the principles which guided Lord St. Vincent, in 1801, are applicable to the present day, and that salva-

¹ The distinction between Q.F. guns and machine-guns is that the former fire shell with bursting charge, the latter only firing bullets.

² "Edinburgh Review," October, 1888.

tion is only to be found in naval blockade.¹ We find some going further and declaring that fortified sea-fronts are not necessary if the Navy is strong enough to efficiently blockade the enemy's ports—others, while admitting the impossibility of an efficient blockade in the presence of steam, and regarding the fortification of naval arsenals, dockyards, and coaling stations as a necessity, appear to think that the rôle of the fleet is essentially defensive; others, again, and these apparently form the bulk of uneducated popular opinion, would fondly hug the Navy close to our own shores, calling it “our first line of defence.” Lookers on proverbially see most of the game, and probably military men are the most deeply interested and least prejudiced of observers in matters naval, naturally desiring that the sister Service may be kept in the most efficient state possible, and that its efficiency may on all occasions be turned to the best account. My premiss is that the possession of naval arsenals, dockyards, and coaling stations must practically decide the question of naval supremacy; that such supremacy is absolutely essential to our existence as a nation; and that the way to secure it is to fortify and arm our own arsenals, dockyards, and coaling stations in such a fashion as to enable them to resist an enemy's attacks, and at the same time to give a free hand to the Navy to attack those of the enemy with such force as may be available, after providing for the patrolling of our principal trade routes (see Table B), and the formation of such fleets as may be considered necessary to enable us to force on a naval engagement when opportunity offers, with forces adequate to inflict a crushing and decisive blow on the enemy. The following table is an extract from the French Official Aide-Mémoire for Naval Officers.

Our extreme vulnerability as a naval Power in the days of sailing ships, when our strength by sea in proportion to that of other European Powers was infinitely greater than it is now, may be gathered from the fact that between the years 1793 and 1800 no less than 4,314 British ships were captured.²

Lloyd's register shows that nearly 700,000 British ships enter or leave our home ports annually; that the value of this shipping is 93,000,000*l.*; and that the value of the imports and exports is 618,000,000*l.*, no less than 140,000,000*l.* of the imports being food.

“The strategical problem for England's fleet is how to keep open her numerous lines of communication, and yet to be in commanding strength at the important naval points and stretches of coast. Major Wachs points to the unprotected state of many of our coaling stations, and to the absence of dockyards in the southern hemisphere, *both as indispensable to a fleet as reserves and supplies are to an army.*”³

Here we have the key of the situation: our own docks and coaling stations must be sufficient for the purpose in view, and not only capable of taking care of themselves but also able to afford protection

¹ “Journal, R.U.S.I.,” vol. xxxii, No. 144.

² “Naval Chronicle” for 1807.

³ Sir Gerald Graham, “Journal, R.U.S.I.,” vol. xxxi, No. 142, p. 1033.

TABLE B.

Fast Cruizers of England, France, and Russia (speed 18 knots and over).

England. ¹	France.	Russia.
Protected cruizers— Mersey, 18. Severn, 18'1. Thames, 18'3.	Cruizers— Tage, 19. Milan, 18. Forbin, 19'5.	Torpedo cruizers— St. Iljui, 20'1. Capt. Sacken, 20.
Belted cruizers— Aurora, 19. Australia, 18'8. Immortalité, 19'5. Narcissus, 19. Orlando, 19 2. Undaunted, 19'9. Mercury, 18'6	Torpedo despatch boats— Bombe, 18. Couleuvrine, 18. Dague, 18. Dragonne, 18. Flèche, 18. Lance, 18. Saint-Barbe, 18. Salve, 18.	Gunboat cruizers— Ceuo Moretz, 20. Donetz, 20. Kubanitz, 20. Toretz, 20. Uraletz, 20. Laporazetz, 20.
Torpedo despatch boats— Grasshopper, 19. Rattlesnake, 19. Sandfly, 19. Spider, 19.		
Total launched. 14	11	8
Protected cruizers— Magicienne, 19'7. Marathon, 19'7. Medea, 20. Medusa, 19'7. Melpomene, 20.	Cruizers— Cecille, 19. Alger, 19. Isly, 19. Jean Bart, 19. Mogador, 19. Davoust, 20. Suchet, 20. Cosmao, 19'5. Coëtlogon, 19'5. Lalande, 19 5. Surcouf, 1'95.	Apparently none of this class being built in Russia at present.
Torpedo despatch boats— Salamander, 21. Seagull, 21. Sharpshooter, 21. Sheldrake, 21. Skipjack, 21. Spanker, 21. Speedwell, 21.		
Total building 12	11	

to all ships which may require a temporary harbour of refuge from whatever cause arising; the enemy's harbours, docks, and coaling stations must be seized or blockaded; and our lines of communication patrolled by fast cruizers. It does not enter into the scope of

¹ Admiral Fremantle gives "Mersey" and four others at 18 knots, in addition to this list, "Journal, R.U.S.I.," No. 143, 1888, but I cannot identify them.

this paper to discuss the inadequacy of our telegraphic communication to such places as Bermuda, Ascension, St. Helena, Gold Coast, Mauritius, &c., or to enlarge upon the insufficiency of our Navy for the duties it will have to perform in the event of war : my main contention is that the command of the sea in the present day practically depends upon the possession of harbours, docks, and coaling stations ; that in peace-time we must render our own coaling stations, &c., secure against naval aggression, and that upon the declaration of war one of the first duties of our Navy will be to attack the enemy's military ports, dockyards, and coaling stations, and thus secure heavy odds in our favour from the outset. In order to secure the greatest results, the rôle of our Navy must be essentially offensive, and it is much to be regretted that an unreasonable dread of bombardment should have been aroused recently by the naval manœuvres, tending to form an uneducated public opinion in favour of keeping our fleets in home waters in any national emergency. Bombardment is an operation which requires a vast expenditure of ammunition and a considerable time to be effective, and the material damage inflicted is by no means proportionate to the cost of the undertaking, or to the risk incurred in carrying it out.

It is essential that the Navy should have a free hand for maritime operations, of a more or less offensive character, and that the fallacy of imagining that our commerce can be carried on by a mere transfer of flag should be clearly exposed. The following extract from Hall's "Treatise on International Law" will show to what extent we can rely upon the good offices of neutral Powers in this respect. The countries mentioned grant their flag as follows :—

Austria to ships owned by Austrians, the Captain and two-thirds of the crew being of Austrian nationality.

Belgium to ships which are five-eighths Belgian property.

France does not recognize the validity of sale of ships by belligerents to neutral Powers, subsequent to the declaration of war.

Germany to ships exclusively German.

Italy to ships officered by Italians, three-fourths of crew being Italian subjects.

United States to ships built in America, captured in war, confiscated for breach of federal law, or bought after shipwreck and repaired to the extent of two-thirds of their value by American citizens.

I will venture to touch upon one more naval question, and that is the question of blockade. It has been stated that to spend money on land defences while our Navy is admittedly insufficient in numbers, strength, and speed for the duties it will have to perform, is an altogether mistaken policy ; and further, that if our naval strength were increased as it ought to be, there would be little or no necessity for any land defences at all, inasmuch as the enemy's ports could be so efficiently blockaded that our shores, our commerce, our Colonies, and coaling stations would be as free from hostile enterprises as they

are in peace-time. Our recent experience of naval blockade, when the "Warspite," "Severn," and "Iris" escaped from Berehaven, and united at a rendezvous off the Hebrides, with the "Rodney" from Lough Swilly, would seem to indicate that the game of naval blockade is likely to be a dangerous and unprofitable one for the blockader, and that the blockading squadron might employ its superior strength to better purpose, and more in consonance with the fighting traditions of the British Navy, by attacking and seizing the enemy's ports and coaling stations, and thus forcing on a decisive naval engagement.

It will, I trust, be granted that the Navy has its own sphere of action, quite apart from the *defence* of ports and coaling stations, and that this duty must rest principally with the land forces. Mr. Stanhope's Committee divides the defence of a port into two parts, "the active and the passive: the active, which is in most countries assigned exclusively to the Navy, includes the provision of gunboats, torpedo-boats, and in some few cases of harbour ironclad ships. . . . The passive defence, which is in this country assigned to the Army, includes submarine mines, quick-firing guns to protect the mine fields, and batteries of heavy guns." In the cases of Portsmouth, Plymouth, and the defences of the Thames and Medway, the ports should be protected not merely against chance cruisers, but against the attack of an ironclad fleet. In the case of the mercantile ports the Committee says: "The most probable danger to be apprehended is not a direct attack upon the ports, *provided that they are placed in a reasonable state of defence*, but that armoured cruisers will be sent to watch the lines of our commerce converging upon them, and to intercept and destroy merchant vessels. Where mercantile ports are situated at some distance up a river, submarine mining defence will in general afford a very great protection. The Committee think it essential that wherever this is adopted, the mine fields should be protected by *quick-firing guns*." I shall endeavour to show, 1stly, what the actual rôle of Q.F. guns should be, and, 2ndly, how their extensive employment may be the means of adding to the efficiency of our defences at a much less cost than could be secured in any other way.

Let us suppose that an enemy's fleet has succeeded by aid of superior numbers or clever manœuvring in driving one of our fleets or a portion thereof to take refuge under the guns of Plymouth, there to refit, coal, and await reinforcements; it is not unnatural to suppose that a large amount of merchant shipping would at the same time be locked up in the harbour. In such a case, the enemy would at once make the most of the temporary advantage which he had secured; he would shell the forts from his ironclads and gunboats, despatch torpedo-boats and cutting-out parties against our war ships, and burn, sink, or capture our merchant ships to the utmost limit of his power; further than this, he would possibly attempt to seize some of the forts and disable the guns; it is not inconceivable that a determined attack by sea upon Plymouth might go hand in hand with a landing in force at Brighton or possibly a daring attempt to seize

the Bristol Channel, which in its present undefended state offers a tempting bait for an enemy's cruisers.

Let us deal first with the enemy's ironclads; we have unfortunately but little information to guide us as to what the fire effect of an iron-clad squadron is likely to be upon a well-defended and protected sea-front, but from the experience of the French at Sfax, and our own experience at Alexandria, it would appear that, so far as the artillery duel is concerned, the guns on shore are likely to have the best of it. "At Sfax, after a remarkably deliberate fire of 2,002 projectiles, delivered under peace-practice conditions, the defensive power of the place is reported to have been practically uninjured."

At Alexandria, Fort Meks, a work of antique construction, armed with five heavy R.M.L. guns, nine S.B. guns, and five mortars, was engaged by the "Monarch," "Penelope," and "Invincible" at 1,200 yards, and the "Téméraire" at 3,500 yards, for nearly four hours, during which time the "Inflexible" joined in for an hour at 3,800 yards; during this period not a single Egyptian gun was disabled, and only two were touched, though altogether 580 heavy and 340 light projectiles had been discharged. On the other hand the "Invincible" was hulled fifteen times and the "Penelope" eight times, in addition to receiving a round shot in one of her ports. Captain Clarke, R.E., commenting upon this action, writes: "If the gunners (*i.e.*, the Egyptian) had been able to handle the R.M.L. guns as well as they did the S.B., and if the armament had been supplemented by a few machine and Q.F. guns on the flank, the ships would have been defeated without any difficulty."²

There is little doubt that we are disposed to rate the fire from big guns on board ship too highly, not only as regards accuracy, but also as to its probable effect: a ship's guns engaging a shore battery labour under two great disadvantages—

- i. The unstable platform from which they are fired.
- ii. Necessity for engaging the shore battery at long ranges in order to compensate to some extent for the superior command of the shore guns.

It has been proved on many occasions that a shell striking the superior slope of a parapet with a horizontal trajectory will do no damage to the revetment, and the splinters will be deflected clear of emplacement.³ Similarly a shrapnel burst on the very crest would do little damage if its trajectory were horizontal. The following table will illustrate the necessity for increasing the range according to the superiority of command of the shore battery in order to obtain a given angle of descent:—

¹ "Protection of Heavy Guns for Coast Defence." Capt. G. S. Clarke, R.E.

² "R.A.I.," February, 1887.

³ Eastbourne experiments.

10" M.L.R. Gun. Charge, 70 lbs. Muzzle vel., 1,364 f.s.

Height of shore battery above plane.	Ranges in yards, necessary to secure the following angles of descent.				
Feet.	Horizontal.	2°.	4°.	6°.	8°.
100	1,050	1,650	2,350	3,000	3,580
200	1,460	1,970	2,560	3,180	3,740
300	1,750	2,230	2,780	3,350	3,880
400	1,980	2,440	2,970	3,480	4,000
500	2,170	2,620	2,130	3,620	4,100

Taking Colonel Nicholson's formula for the cone of dispersion of shrapnel, we find that in the case of the shrapnel for the above gun, the average semi-angle of opening is about 5° between the ranges of 2,000 yards and 4,000 yards; so that the extreme angle of descent of the shrapnel bullets at a range of 3,000 yards, when fired at a shore battery only 100 feet above plane, would be 11° or about $\frac{1}{6}$.

The shore batteries on the other hand have the advantage of command and stability of platform, they are secure from the distractions caused to the ship by torpedo-boats, and the fire of the guns can be controlled even in the most widely dispersed batteries by the Watkin position-finder. A brief description of this instrument, or rather of the method of working it, will at once make clear the enormous advantages which accrue to the defence from its use. Conning-towers and observing-rooms are established in suitable positions, usually one on each flank, each room being provided with a position-finder; the guns are grouped for action and simultaneous electric firing under the control of the observing-rooms, which are in telegraphic communication with each group, and in special electric connection with the position-finding signals of each group; these signals show the training and elevation required at any given moment on a dial. The observing-room which is most suitable on account of the direction of the wind is selected to control the firing, and all orders, signals, &c., communicated from it. The vessels to be engaged by each group of guns are now singled out, and an observer at each position-finder keeps a telescope, with the crosshairs always on the ship to be fired at. An officer watches a plan of the defended waters, on which two pointers move automatically, in accordance with the movement of the telescopes. The intersection of the pointers gives exactly the quadrant elevation and training required for each group. The ship's course and speed being indicated on the plan, it is easy to signal to each group the required laying a minute or so ahead, the signal is read off the dial in the battery, and the gunners have merely to carry out the mechanical duties of traversing and elevating, without requiring to see what is going on outside; when these duties are completed, the electric firing-wire is connected up, the

battery signals "ready" to the observing-room, and the officer in charge can exactly time the fire of the group so as to strike the ship without fail whatever pace she may be going at.

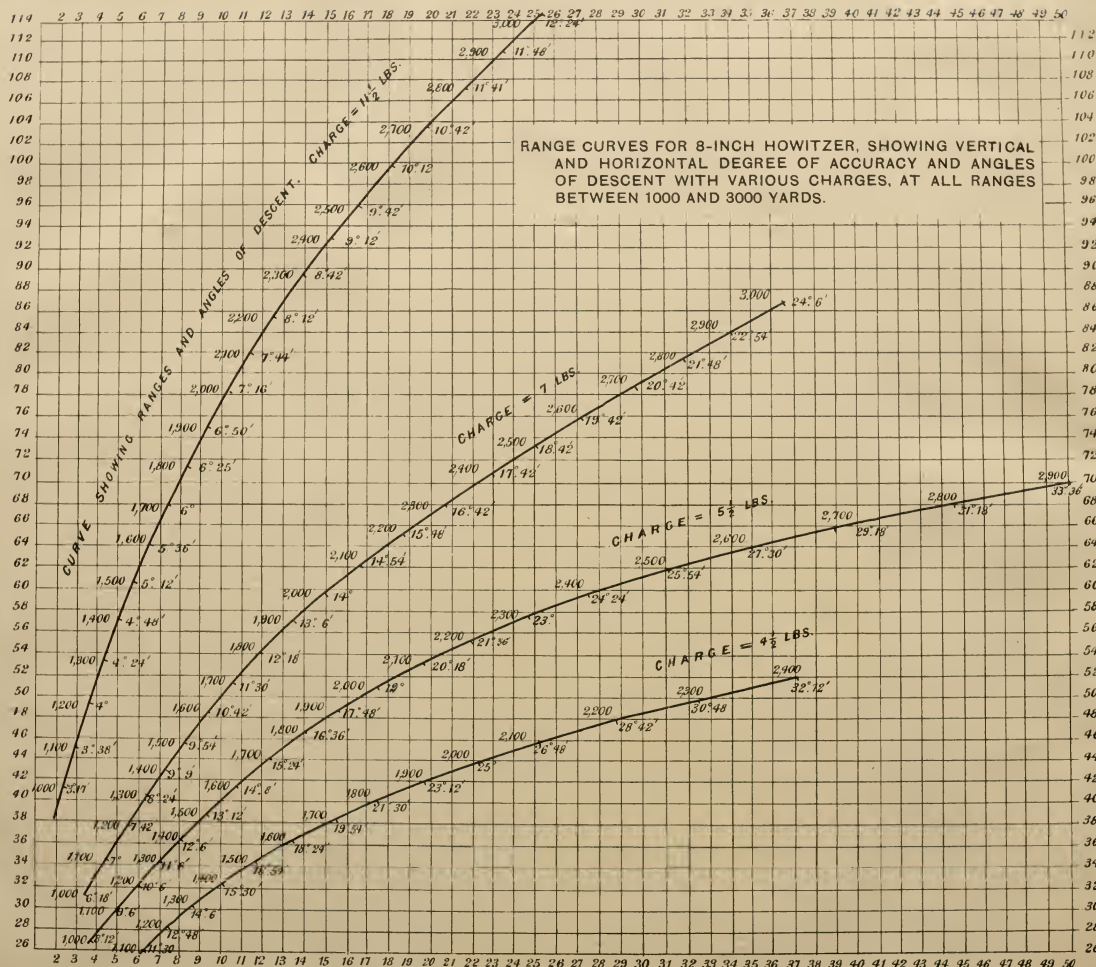
By the aid of quick-firing guns and the position-finder we are enabled to carry out the ideal system of defence, viz., few guns in dispersed emplacements concealed by natural features. This system has long been advocated by Sir Andrew Clarke, and it is difficult to see how any further opposition can consistently be offered to it.

The very meagre results which long-range howitzer fire is likely to attain against such a system of batteries may be gathered from the fact that at 3,000 yards range, the 8-inch howitzer with $11\frac{1}{2}$ lbs. charge is estimated to pitch 50 per cent. of its shells within a *vertical* rectangle 114 feet in length and 25 feet in height, the angle of descent being $12^{\circ} 24'$ (Table A), or $\frac{1}{4\frac{1}{4}}$. This is certainly the minimum range at

which a ship's gun could engage an elevated shore battery with any hope of success as regards "searching effect," and any attempt to move in closer, in order to improve the accuracy of the howitzer fire, would be done at the sacrifice of a large amount of gun fire from the ships and the risk of utter destruction to men and material from the Q.F. guns on shore.

It is to be presumed that we shall have a complete system of submarine mine defence at all our naval ports. Mr. Stanhope's Committee specially recommends this kind of defence for harbours lying some little way up a river, such as Liverpool, and at the same time points out the necessity for protecting the mine fields in every case by Q.F. guns. In the attack of any port or harbour, the question of removing the defender's mines has to be considered before anything in the shape of a decisive action can be fought. The mines may be removed by "sweeping," "creeping," or countermining; all these operations are more or less tedious and dangerous, and would be rendered absolutely impossible under the fire of Q.F. guns; countermining at night appears to be most in favour in the Navy, but where the electric light is able to illuminate the mine-fields, such an operation would very soon cease to be attractive. The assailant will probably in the end form an inshore squadron of gun and torpedo boats, and organize boarding, landing, and cutting-out parties. Attacks by day and surprises by night will be attempted, and the defence will be severely tried; the only reliable defence against the assailant's inshore squadron will be the extensive employment of Q.F. guns of sufficient calibre, not merely to annihilate landing or boarding parties, or to send a torpedo-boat to the bottom, but equal to the task of putting a gun-boat *hors de combat*, and either wrecking her or making it possible for the *active* harbour defence to capture her. Quick-firing guns, whether made on the Hotchkiss, Armstrong, or Nordenfelt principle, or on the automatic Maxim system, are practically *non-recoiling*; thus there is an immense advantage gained not merely by the mechanical or automatic breech-closing arrangements, but also an immense gain in time owing to the absence of recoil, and the avoidance of the necessity for relaying after every shot when firing at a stationary or

HORIZONTAL SPACE IN FEET, WITHIN WHICH 50 P.C. OF SHOTS SHOULD FALL

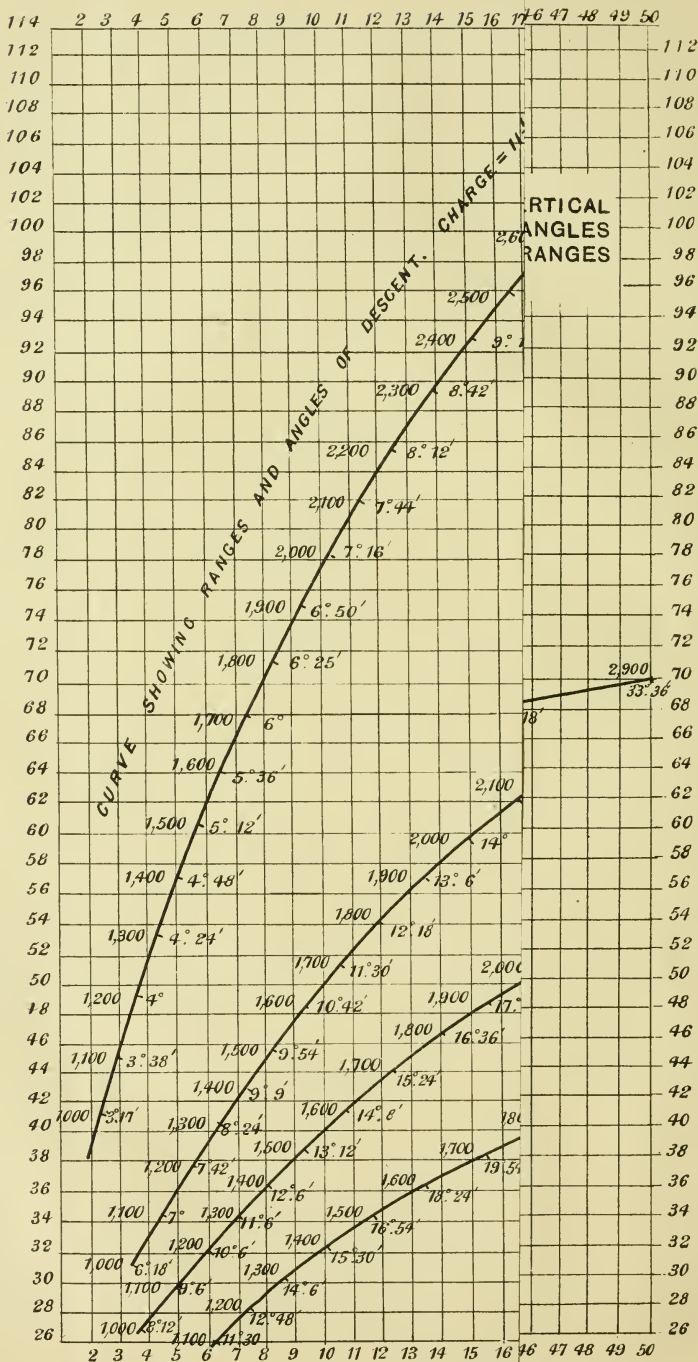


VERTICAL SPACE IN FEET, WITHIN WHICH 50 P.C. OF SHOTS SHOULD FALL

HORIZONTAL SPACE IN FEET, WITHIN WHICH 50 P.C. OF SHOTS SHOULD FALL

HORIZONTAL SPACE IN FEET, WITHIN WHICH 50 P.C. OF SHOTS SHOULD FALL

HORIZONTAL SPACE IN FEET, WITHIN WHICH 50 P.C. OF SHOTS SHOULD FALL



nearly stationary object. Thus a 3-pr. Q.F. gun (Maxim), firing twenty rounds in a minute (which is about half its maximum rate),¹ throws the same aggregate weight of shell as a 64-pr. M.L. gun is capable of discharging in the same time; it has, moreover, a penetration of 4 inches into armour-plate, while the effect of successive rounds striking the same spot would be difficult to estimate; it may, however, be noted that any kind of armour built up in segments, such as that of a Gruson turret, is affected most seriously by being struck two or three times in the same place.² Moreover, the results obtained as regards the penetration of the shells of our new high velocity guns are notoriously unreliable; the shell usually turns off into the line of least resistance, and it seems fair to conclude that a rapid succession of comparatively small projectiles striking the same spot will produce a greater effect than the impact of a single very heavy projectile. At Alexandria, a shell from the 80-ton gun of the "Inflexible" penetrated only 20 feet into sand at a range of 2,000 yards, and at Eastbourne an 8-inch Palliser shell penetrated only 6 feet into a loam parapet at 1,200 yards.

At some competitive trials carried out last year by the Admiralty between a 4 $\frac{3}{4}$ -inch Q.F. gun and a 5-inch Service B.L. gun, the former fired ten consecutive aimed rounds in forty-eight seconds, while the latter took five minutes seven seconds to fire the same number.³ It does not appear necessary that Q.F. guns for this kind of defence should be of very large calibre; probably a 5-inch gun, throwing a projectile of about 40 lbs., would be the maximum required, giving a penetration of 12 inches into wrought iron.⁴ Any attempt to go beyond this for the purpose of obtaining higher penetration would be misplaced, though doubtless quite feasible; in fact, a 12-pr. Q.F. gun would serve most purposes, and the results already achieved by the 6-pr. Hotchkiss are instructive on this point; at Eastbourne a shell from one of these guns struck the chase of a 10·4-inch B.L. gun and penetrated into the bore; at Shoeburyness a 9·2-inch B.L. gun was struck on the chase and a bulge of nearly half an inch raised on the interior of the bore, thus rendering it unserviceable. There can, therefore, be no question that these guns are sufficiently powerful to cope with an inshore squadron of gun and torpedo-boats, they have, moreover, the immense advantage of being susceptible of rapid correction for laying and being capable of following up a moving object with continuous fire; thus we will suppose a torpedo-boat advancing to within 400 yards of a shore battery of Q.F. guns, in order to discharge its torpedo against some of the shipping in the harbour: the boat advances at the rate of, say, 20 miles an hour, and the Q.F. guns on shore open fire at 1,000 yards range: the dangerous zone for the

¹ This gun has fired 70 *unaimed* rounds in a minute; the deduction to be made for aimed rounds must necessarily vary according to circumstances: it may, however, be taken as a general rule that two consecutive *aimed* shots could be fired in two seconds by a trained man.

² At Buchan a single segment of a Gruson turret broke up under four closely adjacent hits from a 12-inch gun. "R.A.I.," vol. xv, p. 182.

³ Penetration of 4 $\frac{3}{4}$ -inch Q.F. gun into wrought iron = 10 $\frac{1}{2}$ inches.

⁴ Penetration of 5 $\frac{1}{4}$ -inch Q.F. gun into wrought iron = 15 inches.

boat to cover in its advance is therefore 600 yards, and this would be accomplished in about one minute: this enables a 12-pr. or 14-pr.¹ Q.F. gun to fire from sixteen to twelve aimed shots, and gives the torpedo-boat very little chance if it has to run the gauntlet of rapid fire from a battery of four to six of these guns. What chance would the best ordinary B.L. gun have in such a case? At the very outside it could not put in more than two aimed shots, and the knowledge that the race against time was in favour of the boat would inevitably flurry the gunners and minimize the chances of a successful shot.

It seems to be within the bounds of probability that at close ranges, with a fair amount of training and practice, a gunner could learn to fire at a moving object with his Q.F. gun, on the same principle that a sportsman fires at driven partridges, and the conscious process of *laying* be merged in the instinctive and rapid *snap shot*, all the lighter natures being fitted with a shoulder piece, and free to move in any direction at the will of the firer.

Boarding, landing, and cutting-out parties could be opposed with the greatest certainty of success, the rifle calibre machine-gun supplementing and taking the place of the Q.F. gun, as soon as destruction to material was no longer desired.

There are two objections commonly raised to the employment of Q.F. guns: (1) The smoke, (2) complicated mechanism and liability to get out of order. With regard to the first point; if the smoke hangs over any gun, it is impossible to lay it, but in the case of the Q.F. gun, we can at any rate get in more shots than with the ordinary gun, inasmuch as the laying is not disturbed;² besides which, the fact of our powder being bad (as regards smoke) is no argument for discarding all improvements in gun-making, and apparently we are in a fair way to getting over this difficulty if we may rely upon what Mr. Stanhope said on November 1st at the Holloway Hall: "The progress which might be desired has not been made in the use of high explosives, but many trials have been made, and the Government now see their way to the introduction of an explosive for use with big guns, the effects of which are described as extraordinary." Mr. Stanhope does not inform us whether this explosive is to be used as a propelling agent, or if it in any degree obviates the smoke difficulty; but I believe the Chilworth Company have in some measure succeeded in obtaining good results, while a firm of gunmakers are within measurable distance of emulating the results recently obtained by the French. An eye-witness, describing the firing of the Maxim automatic machine-gun in France with smokeless and noiseless powder, told me that as he stood out on the range watching the results of the silent and invisible discharge from this weapon, the effect was truly appalling, and of a character to shake the nerves of the stoutest hearted.

With reference to the second point, I cannot help thinking that we are too ready to raise objections to new inventions on the score of complication, and to overlook the delicacy and liability to injury

¹ Penetration of 14-pr. Maxim-Nordenfelt Q.F. gun into wrought iron = 8 inches.

² Of course *all* guns are rendered independent of smoke, by the position-finder.

which exist in our own Service patterns of guns: probably the reason is that we hear nothing of the failures in our own gun factories; whereas any new invention from extraneous sources is not only put through its paces pretty severely before being adopted into the Service, but the experiments are eagerly watched by a host of hostile critics, and the results made known to the whole world; the natural tendency appears to be to look out for defects rather than to discover the good points, and this in a measure is very desirable, just as Her Majesty's Opposition is desirable, but at the same time, in questions of really national importance, we should strive to divest ourselves of all party feeling and prejudice, and frankly acknowledge and turn to the best account whatever is for our country's good, no matter from what source it may emanate. It does not appear to occur to those who habitually range themselves on the side of the opposition, that our new B.L. guns can be put temporarily out of action by a single bullet burring the thread of the screw on the breech-block, nor do they seem to realize that the terrific sandstorm which is suppose to rage perennially around a machine-gun, as evidenced by the severity of the *sand-test*, would be equally detrimental to the breech-closing apparatus of the magnificent guns of which our Royal Gun Factory has reason to be so justly proud. The following table will open the eyes of many to the fact that few guns are infallible, and that the occasional breakdown of ordnance of all descriptions is a contingency to be reckoned with, and not necessarily a reason for sweeping condemnation of any particular manufacture or design whether it emanates from Woolwich or from a private firm.

Guns which have Fired over 250 and under 1,200 Rounds, with the number of each Class Condemned or Repaired.

	R.M.L.			
	10-inch.	11-inch.	12-inch.	12·5-inch.
Fired.....	40	4	4	5
Condemned or repaired ..	14	—	3	2

	R.B.L.		
	4-inch.	7-inch Armstrong, old pattern.	16-inch.
Fired	19	74	1
Condemned or repaired	7	8	—

Army Return (Guns), April, 1887.

With reference to the position of batteries of Q.F. guns in modern fortified sea-fronts, it appears that the highest and the lowest sites would offer the greatest advantages, the intermediate sites being retained for the existing armaments of heavy guns; and the somewhat heterogeneous collection of muzzle-loading guns of the older types which exist in some of our fortresses being made a clean sweep of, such guns not only lead to a false feeling of security and occupy valuable sites which might be better filled at a comparatively small cost, but they are a source of extreme danger on account of the complication of ammunition. In the case of batteries which have only two tiers of fire, and where it is considered desirable to retain the heavy guns near to the water-line, batteries of Q.F. guns might be placed on the flanks. The object of thus arranging the guns would be that the high level tier should be enabled to attack the decks and machinery of ironclads with plunging fire at a great comparative advantage as regards:—(1) Field of fire, (2) observation of fire, (3) accuracy, and (4) penetration; the guns of the ironclad being unable to reply effectively, except at long ranges with high elevation and curved trajectory: the ship guns could not fail to be more or less exposed, while the shore guns, inexpensively mounted *en barbette* in dispersed emplacements, would offer a mark which it would be almost impossible to hit.

The low tier intended solely to engage the enemy's inshore squadron would be on equal terms as regards flatness or rather horizontality of trajectory, but would have an immense advantage in rapidity of fire at critical moments, and also in the amount of cover which could be given them, for with comparatively light guns, there would be no difficulty in *muzzle-pivoting*, and their port-holes could consequently be reduced to a minimum. The flanking batteries would bring a cross-fire to bear upon any gunboats advancing directly on the fortress, and would very quickly dispose of any torpedo-boats before they had a chance of discharging their submarine projectiles.

It seems to me that the balance of advantage lies with the fortress, and that if the armament be satisfactory, and the men well trained, it will be able to fill its proper *rôle* in giving protection to our ships, whether they be ironclads come in to coal or refit, or driven in by superior force for shelter, or merchant-vessels seeking refuge or awaiting convoy.

The argument for Q.F. guns to protect mine-fields is of peculiar cogency, for if it be the case that the explosion of a submarine mine under an enemy's vessel would render the passage at that point impracticable for our own shipping, it becomes of supreme importance that a mine should be fired only as a last resource, the possibility of maintaining a safe channel for our own shipping unknown to the enemy being doubtful; a combination of submarine mine defence with batteries of Q.F. guns would be sufficiently formidable to check any rash enterprise against our commercial ports; and here again practice in peace-time is essential if we would avoid the risk of our ports being prematurely closed to our own commerce. It is

most satisfactory to note that Mr. Stanhope's Committee consider "that steps should be taken to afford additional opportunities for practice to all those who will have to take part in submarine mining operations in time of war." I trust that this recommendation may be acted on.

A certain amount of money has lately been voted for the defence of our ports and coaling stations, and everyone wishes that it may be spent to the best advantage, though naturally there are many conflicting opinions as to how this should be effected. Doubtless, there are some who are enamoured of the Bessemer scheme, and would like to see the skin of a fort built in fireproof brick, and furnaces erected for pouring in molten steel until the mould was full; there are others again who would make a clean sweep of all fortification, saying: "Give us ships, and we will do all that is required in every quarter of the globe." A sailor loves his ship, but I should imagine his gun had to put up with the second place in his affections, though sailors are proverbially large-hearted. Being a gunner, I am possibly prejudiced in favour of guns, and my contention is that to employ the Navy for coast defence is a mere waste of strength which we can ill afford, and would be bad policy if we could afford it; that any extensive elaboration of our complicated systems of permanent fortification is to lose sight of the end in constructing the means, and that what we do require for security in defence and potentiality for offence is a suitable armament of the best guns we can get mounted in dispersed and concealed emplacements, and a sufficient number of gunners trained up to such a point that the maximum effect may be obtained from the guns. A couple of well-placed earthen barbette batteries containing a dozen Q.F. guns might do more for the defence of any given position than the most approved casemated battery or turret mounting an 80- or 100-ton gun.

Mr. Anderson, C.E., stated his belief "that the Dover turret would be so damaged by a single 16-inch shell that it would be impossible to work it any more. The energy of one of the bolts of the "Inflexible" striking, say, at 2,000 yards range would be represented by the whole of the Dover turret, which weighs 750 tons, rising 16 feet into the air. Is it conceivable that no derangement would result from such a blow?"¹

The difference in the cost of pursuing such a system as I have attempted to lay before you, or of following the old lines of massive iron and masonry fortifications and colossal guns, may be conjectured when we remember that the cost of the 100-ton Armstrong gun was 16,743*l.*, the R.G.F. 13.5-inch gun of 67 or 69 tons was 10,859*l.* 12*s.* 7*d.*, the 80-ton M.L. 9,811*l.* 6*s.* 3½*d.*, and the 38-ton M.L. 3,199*l.* 8*s.* 0¼*d.*²

When the cost of carriages, slides, transport, mounting, machinery, and protection is added to these figures, it may well make us pause

¹ "Journal, R.U.S.I.," 1884.

² Blue Book, April, 1887.

to consider whether we are spending our money to the best advantage.¹

Land-Fronts.

Thus far I have treated the question of fortress defence entirely from the sea-front point of view; the defence of land-fronts, though not of such pressing interest to us as a maritime Power, is, however, of vital importance, whether we consider the land defences of our great military ports, rejoicing in all the elaboration of permanent fortification, the proposed works for the defence of London, or the combination of old-fashioned permanent, and modern field fortification for the protection of our Indian frontier.

For many reasons we are not likely to enter upon the construction of large permanent works which, as General Hamley says, "are great drains on the resources of a country, expensive to construct, and expensive to maintain;" besides which, "a few" such works "will swallow up for their necessary garrisons armies that might turn the scale of a great war in the open field. The constant improvement in high explosives is another argument against undertaking permanent works of elaborate trace and immensely strong profile, provided with armoured batteries, which cannot hope to keep pace in the struggle for precedence with the ever-increasing power of shell-fire."²

History indicates that well-planned field works, aided by abundant resources in men and material, can be made quite as strong as permanent works. The celebrated case of the lines of Torres Vedras, which Wellington had "artificially fortified so as to be absolutely impregnable for many miles of their length . . . the passes being defended with strong works armed with heavy artillery" (Hamley), is an instance of what can be done in the way of field fortification when the base is easily accessible.

The case of Sebastopol is even more instructive, affording as it does an actual parallel to cases with which we may ourselves have to deal in the event of an invasion of our territory. "Of permanent land defences on the south side of Sebastopol there were practically none. In the spring of 1854 steps were taken to protect the town . . . loop-holed walls, barricades, and a few simple batteries gradually developed into a vast system of earthworks such as the world has never seen. By September the defences of the south side mounted 172 guns ready to oppose the 126 guns of the Allies in the first bombardment begun on the 17th October. It was expected that Sebastopol would fall after a short cannonade. The siege lasted 349 days, and at its close the Russians opposed 982 guns in the first line to

¹ The turret, mounting and machinery, exclusive of the guns, at St. Chamond, cost 3,000,000 francs (say 120,000*l.*), *vide* "La Fortification du Temps Présent." Brialmont, p. 300. Cost of Gruson cupola for two 6-inch guns = 7,500*l.*

² At Port Lobos a 6-inch howitzer throwing a shell containing 11 lbs. of explosive gelatine at a range of 1,100 yards, made a breach in a rock escarpment 6 feet deep and 25 feet in diameter; splinters being thrown to a distance of nearly 900 yards.

about 800 guns of the Allies. The case of a defender possessing a large reserve of guns, and whose operations were directed by a soldier of genius who knew how to use them, had not been taken into account.”¹

The lessons which the Russians learnt before Arab Tabia in May and June of 1854, and again before Plevna more recently, appear to have established the fact that field works constructed on a proper system, and defended energetically, cannot be taken by assault, and that the regular siege must be resorted to in such cases just as inevitably as in the case of permanent works.²

The probable nature of the attack being thus established, let us consider in what degree the employment of Q.F. guns is likely to aid the defence. Sieges have usually commenced with the establishment of a number of batteries for the heaviest guns of the siege-train at distances regulated by the range of the ordnance employed; the object of these batteries is to engage the artillery of the defence and to subdue it to such an extent that the siege trenches may be pushed on without let or hindrance; the establishment of this 1st Artillery position exercises an important influence on the subsequent course of the siege, and any supineness on the part of the defenders at this stage of the operations will enable the assailants to establish their batteries in the most favourable positions, thus placing the artillery of the defence at a disadvantage from the very outset. The estab-

¹ “Land Fortification,” Major Clarke, C.M.G., R.E., R.A.I., June, 1888.

² I do not wish to be understood to advocate *improvised* field works for the defence of important positions. The case of Torres Vedras was one of most elaborate preparation, with abundance of resources, and a secure base. In the case of Sebastopol, the work which was done *during* the siege ought to have been completed *before* the siege; very few troops would have borne the terrible losses which the working parties suffered, with the same imperturbable pluck as the Russians exhibited; no one recognized more fully than General Todleben the disadvantages of having to inaugurate and carry out his defensive works in the presence of the enemy. Plevna has furnished the advocates of *improvised* field fortification with a sort of catchword; but it was merely an instance of bad generalship on the part of the Russians, enabling the Turks to secure advantages which otherwise could only have been gained by previous preparation. The position was peculiarly favourable: Osman Pacha retired upon Plevna with 25,000 men, 18th July, 1877; the Russians, without preparation, attacked on the 20th July, with only 7,000 men. Immediately after their repulse, Osman took in hand the improvement of the fortifications, and reinforcements brought up his strength to 45,000; he was thus in a position to repel the second attack of the Russians on 30th July: he followed this up by an unsuccessful sortie on the 31st July. On the 11th September the Russians, having prepared the attack by a bombardment of four days, assaulted with 50,000 men, the garrison having in the meantime been increased to 60,000, and the fortifications brought to a high state of perfection. This assault, like those which preceded it, was unsuccessful, and the Russian losses having now amounted to 30,000 men, General Todleben advised the Emperor to resort to blockade. On the 9th December Osman Pacha essayed to cut his way out to Sophia; he was defeated and had to surrender. It will thus be seen that Osman Pacha, with a superior force, in the face of an enemy who had no idea of systematic attack, was favourably placed to an extent which puts the Plevna defences altogether out of the category of *improvised* field fortification; it is, however, none the less instructive, as showing the hopelessness of attacking a well organized system of field works by any other method than that of blockade or regular siege.

lishment of the 1st Artillery position consists of three operations (1) reconnaissance, (2) building, and (3) arming the batteries; it is during the last two operations that the defenders must utilize all their resources, night and day, to defeat the object of the besieger. The guns which are already mounted on the front to be attacked must strenuously oppose the building of the batteries from the outset; these guns must be strongly reinforced with the utmost celerity, and the subsequent arming of the enemy's batteries rendered as costly an operation as possible, special attention being devoted to the batteries which are likely, from their position, to cause most annoyance to the defence. Every nerve must be strained during this period to destroy the enemy's works and disable his guns *before* they are in a position to reply; a couple of hours now is worth weeks subsequently; it is, above all others, the occasion on which the material odds are in favour of the defence; every improvement which has been made in recent years in guns, gunnery, and gunpowder is at the disposal of the defence, while for a brief space the assailant is no better off than if he had nothing but bows and arrows; cover has to be erected for his guns in certain positions, and the guns have to be mounted in those positions before any effective reply can be made to the defender's artillery. Here, indeed, is an opportunity for the Q.F. guns; the maximum of work has to be accomplished in the minimum of time, and it is not only in the actual rate of firing of the guns already in position that the defence secures an initial advantage, but equally in the rapidity with which the guns can be brought up to reinforce any threatened part of the works owing to their comparative lightness.

"There is in addition another point, the importance of which can hardly be over-estimated, viz., the increasing use of the system of offensive defence; even the imperfect use made of detached forts in 1870-71 shows that an active defender will for the future use the forts chiefly as a line of keeps and observatories in a great defensive position, the forts themselves only mounting such guns as can be thoroughly well covered; while a number of these guns, as well as a proportion of the artillery from works not engaged, will be posted in siege batteries between or just in rear of the line of forts, and connected with them by trenches; in rear of these trenches fresh batteries can be made into which to shift any guns that may be too hardly pressed by the attack."¹

The arming of these batteries will be a comparatively light task if Q.F. guns of suitable calibre are available, and the advantage accruing to the defenders will be threefold.

1. The mobility of the armament, compared with what would be required in the case of slow-firing guns.²

¹ "Manual of Siege Artillery," p. 14.

² Thus a 14-pr. Maxim Q.F. gun, firing deliberately at the rate of one round in every five seconds, throws an aggregate weight of 168 lbs. in a minute; while a 40-pr. B.L. gun of the siege train in order to compete with this would have to fire at the impossible rate of four rounds a minute. The weight of the 40-pr. gun and carriage is more than double that of the 14-pr. Q.F. gun and carriage.

2. The continuity and rapidity of fire at critical moments, rendering the construction, arming, or repair of the enemy's batteries an absolute impossibility.

3. The smallness of the mark offered to the enemy's fire, and the comparative ease with which suitable protection can be afforded.

The besieger meanwhile endeavours to push forward and establish his first parallel just outside the effective musketry range of the place, the batteries of the 2nd Artillery position being established in its vicinity. These batteries will be principally howitzer batteries, for the purpose of breaching, demolition, and searching the interior of the work; the attempt to counterbatter any given face of a work having given way to the more certain method of rendering the emplacement untenable by wholesale demolition of the parapet by howitzer fire. For this purpose, as well as for breaching, considerable accuracy of fire is required, and a glance at Table A will show to what extent the accuracy of the shooting is affected by the range; the question of effective striking velocity is of no interest, inasmuch as with the 6·6-inch howitzer the s.v. is never less than 420 f.s., even with the minimum charge of 1 lb., and a s.v. of 439 f.s. at an angle of descent of 19° will lodge a proportion of shell in a concrete wall; with the 8-inch howitzer the lowest s.v. is 432 f.s. at a range of 1,500, and beyond this range, the s.v. increases. The power of accurate howitzer fire to breach earthen parapets was shown by the experiments at Dungeness, in 1882, when an earthen parapet 30 feet thick was breached by 7 rounds (6 effective) of 8-inch howitzer common shell at 1,200 yards range. On the other hand a howitzer battery (6-inch cal.) at Strasbourg failed to make a practicable breach after 467 rounds at a range of 770 yards.¹ This may have been due to the action of the fuze being too quick.

The following extract from Table A will show how the accuracy of the 8-inch howitzer is affected by the range :—

Range, yards.	Angle of descent.	Vertical margin of error for 50 per cent. of shots, in feet.
1,200	4° (11½ lbs. charge)	3·63
	12° 48' (4½ lbs. charge)	6·66
1,500	5° 12' (11½ lbs. charge)	5·52
	16° 54' (4½ lbs. charge)	10·35
2,000	7° 16' (11½ lbs. charge)	10·08
	25° (4½ lbs. charge)	20·86

This would appear to fix the position of the howitzer batteries for breaching and demolition at an average distance of a mile from the works, and beyond 2,000 yards it is clear that accurate shooting could not be expected.

With regard to howitzer batteries for searching the interior with

¹ Brialmont, "Fortification du Temps Présent," p. 201.

shrapnel, an extract from Table A gives us an idea of what may be expected from the 8-inch howitzer.

Range, yards.	Angle of descent + 5° (= semi-angle of opening for shrapnel).		Horizontal margin of error for 50 per cent. of shots, in feet.
1,200	9° 0' = $\frac{1}{6}$	(11½ lbs.)	49·2
	17° 48' = $\frac{1}{3}$	(4½ lbs.)	27·9
1,500	10° 12' = $\frac{1}{5·5}$	(11½ lbs.)	60·3
	21° 54' = $\frac{1}{2·5}$	(4½ lbs.)	34·2
2,000	12° 16' = $\frac{1}{1·6}$	(11½ lbs.)	78·3
	30° 0' = $\frac{1}{1·7}$	(4½ lbs.)	44·7

In order to be most effective, then, these batteries would be established, if possible, about 1,500 yards from the works to be attacked, probably just in rear of the first parallel, and it is at this point in all probability that the sieges of the future will virtually be decided. The energetic defender, with his mobile armament of Q.F. guns, aided by the electric light, will be in a position to dispute every inch of the ground; the defence will be of the most active and aggressive character, and the assailant's working parties will not be left a moment in peace; the construction and arming of the besieger's batteries will involve such a sacrifice of life, that the raising of the siege may confidently be expected. If, however, we grant success to the besieger up to this point, it still remains for him to assert the superiority of his artillery fire over that of the defence, before his trenches can be pushed forward in advance of the first parallel. In order that this may be carried out effectively, it is generally agreed that all the batteries of the 2nd Artillery position should open fire simultaneously at daybreak on the morning when the arming has been completed. General Brialmont says: "The artillery (of the 2nd position) should obtain a marked ascendancy over that of the defence, in order to render the approaches possible; the fire from this position must be more rapid than that of the first position."¹

The besieger² is, moreover, credited with the power of concentrating the fire of a superior number of guns upon the fronts attacked, owing to the greater area available for gun emplacements which he

¹ "Fortification du Temps Présent," p. 198.

² When batteries are efficiently screened, their construction and arming can be more deliberately carried out, and the necessity for opening fire simultaneously at daybreak is not of paramount importance. The besieged would, however, devote their attention at an early period to preventing the building of the screens.

can command, compared with the restricted sites which can be utilized by the defenders.

If, however, the besieged have the advantage of Q.F. guns, the tables are completely turned, for not only is the fire of the place able to hold its own from the outset, but the rapidity with which it can be delivered will more than counterbalance the numerical superiority of the besieger's pieces. We may fairly conclude under these circumstances that the assailant's advance beyond the first parallel will be tedious and painful in the extreme, that heavy losses will have to be faced in cold blood, and that his *morale* will inevitably suffer; "common trench work" will have to give way to "flying trench work" at a very early stage of the proceedings, necessitating heavy additions to the impedimenta of the siege train, and excessive exertions on the part of the working parties; the guard of the trenches will have to be considerably strengthened to resist the sorties, which, under the given circumstances, will be of a more sudden and effective nature than has hitherto been the case; and finally the approach, even by "flying trench work," will have to give way to the snail's pace of the "sap";¹ moreover the "shallow sap" will avail little when the concentric fire of a few Q.F. guns is brought to bear upon the sap head;² and the advance by "deep sap" for a few hundred yards is an undertaking which might well damp the ardour of the most persistent. Let us, however, concede the possibility of establishing the third parallel, which in an ordinary case might be pushed forward to within about "70 yards of the crest of the glacis, when there are no countermines, and about double that distance if there are."³

It is inconceivable that a successful assault could be delivered from this parallel, over ground prepared with obstacles, and swept by the deadly fire of machine-guns and magazine rifles; the further approach by sap presents immense difficulties, which, however, must be faced if the subsequent assault is to have the smallest chance of success; obstacles must be removed, and, if possible, further cover provided between the third parallel and the crest of the glacis; guns and howitzers must be brought up to short ranges to subdue the fire from the covered way, and finally, recourse must be had to mining to blow in the counterscarp, and prepare a practicable opening into the ditch for the assaulting columns.

¹ 1 yard per hour.

² Extract from Report of Lydd experiments by Colonel Baylay: "Range 300 yards; target single deep sap, double sap, blinded sap:—Even with the less powerful piece (6-pr. Hotchkiss Q.F. gun) very few rounds sufficed to effectually demolish the sap heads, and also in the case of the single sap, the 'earlier executed' portion of the work. With regard to the blinded sap, the frame capsills, being exposed as soon as the sap head was demolished, were soon cut through, leading to the fall of the overhead cover."

"Target—kneeling sap, inclined at 30° to line of fire:—the 6-pr. Hotchkiss common shell burst in the sap roller without displacing it; the fragments of shell appeared to search the head of the sap thoroughly." It was noted that ring shell proved more destructive than common shell.

³ "Fortification du Temps Présent." Brialmont, p. 201.

The next operation will be the passage of the ditch; and it is usually assumed at this juncture that the flank defence of the ditch has been so impaired by the besieger's artillery fire, that the resistance to be anticipated will be comparatively feeble. The provision for flank defence varies in different types of works; in the older traces, wide ditches flanked from the parapets were the order of the day; modern ideas have demanded a simpler trace and more frontal fire, relegating the flank defence to caponiers and counterscarp galleries; these again are likely to be extensively modified to suit future requirements, and there is little doubt that flank defence of this kind could be easily destroyed by the fire of modern howitzers. The existence of a ditch is not an unmixed blessing, but where it does exist it must be defended, and defended with considerable vigour, inasmuch as it would otherwise afford a ready made parallel or place of arms for the assailants from which to base the subsequent assault in security. Military economists chuckled enormously when they discovered that our old smooth-bore 32-pr. guns need not be thrown away, but could be used for the flank defence of ditches. These guns, after being converted into breech-loaders, are excellent weapons for firing case shot, but they are of a hybrid nature, being less effective in man-killing power than machine-guns, and of very little value indeed for the destruction of material such as sap shields, earthworks, &c. Here, indeed, is a position in which rapid and heavy fire is an absolute necessity, and the enormous advantage conferred by Q.F. guns in the flank defence of ditches can scarcely be overrated.

It must be borne in mind that though machine-guns throwing bullets are most valuable, nay indispensable, for this purpose, they are not everything, and a few Q.F. guns throwing shells are required to destroy the enemy's works in connection with the passage of the ditch: the escarp has probably to be blown in, and blinded cover erected across the ditch to protect the storming party, and this work must be opposed from the outset. Batteries for flank defence will probably be placed in caponiers of some sort in the future, but if they are armed with Q.F. guns these works can be so reduced in size and strengthened in construction that nearly all objections to their employment fall to the ground. General Brialmont (*"Fortification du Temps Présent,"* p. 144), says: "The necessity for placing the most important pieces under protection from direct, curved, or high angle fire cannot be contested: the employment of armoured batteries will restore the balance of advantage in favour of the defence." To deliberately offer a large mark to the enemy's fire by mounting a large number of the worst guns we possess in an important position such as the flanking works of a ditch, is to court defeat, and is an economy of the falsest kind: what we require is a strongly armoured battery of the smallest dimensions, mounting a very few Q.F. guns of about 4-inch calibre, and capable of doing the maximum of work in the minimum of time and space.

Let us now pursue the siege one step further, and grant that the assailant has succeeded in silencing all flank fire, and formed a prac-

ticable breach in the escarp, and that the assaulting columns are being assembled close up to the counterscarp ready for the descent into the ditch. During the period of preparation for the assault, the defenders will have been busy retrenching the breach and mounting a few Q.F. and machine-guns to play upon it as soon as the assaulting columns mount the *débris* of the broken-down escarp; the work of retrenchment will of course be opposed by a concentrated fire from the assailant's guns, and this will have to be kept under by the guns of the defence; at this advanced period of the siege such an operation would be attended with extreme difficulty, and it is probably at this epoch that the defence will labour under the greatest disadvantages, which, however, will be minimized by the rapid fire of the Q.F. guns of the defenders. The critical moment does not arrive until the storming party delivers the assault, and then, indeed, the Q.F. and machine-guns of the defence should have it all their own way.

It is, however, most improbable that a cool and clear-headed commander, with an armament of Q.F. and machine-guns to supplement the howitzer and heavy armament, and a garrison well versed in siege and fortress manœuvres, could ever permit the most enterprising assailant to come to close quarters on the near side of the ditch.

In the case of an extensive system of detached works, such as some of us would like to see round London, the questions peculiar to permanent fortification (as the term is generally understood) would of course be eliminated from the above considerations. Such a system would probably consist of a double line of field works of strong profile, the front line consisting of open, the rear line of closed works; in every case the trace being as shallow as possible, and arranged for the fullest development of frontal fire: "this," says Colonel Brackenbury, "should certainly be prepared for, as we cannot have permanent fortifications. But where are the guns to come from?"¹ The present idea apparently is to entrust the defence of London to the volunteers, the armament consisting of the guns which have been superseded in the regular Service, so that in the defence of the capital we shall have a volunteer army, improvised works, and an artillery which will inevitably be inferior to that of our opponents. What this means may be gathered from the history of Sebastopol. The artillery of the Allies was superior in quality to that of the Russians, many of the Russian guns throwing shot or shell without bursting charges. On the 5th, 6th, and 7th September the British guns fired 122,000 rounds, as against 55,000 fired by the Russians; the losses during the same period were British 839, Russians 7,561, in addition to which 89 guns were dismounted and 113 platforms destroyed.

Before concluding, I should like to say a word as to the mounting of Q.F. guns. In permanent batteries, of course, the weight of the mounting is altogether a minor consideration, and the gun can be made so absolutely non-recoiling that the laying is in no way affected. I have, however, alluded to Q.F. guns on field carriages, and in this category I would include also siege carriages; such carriages must

¹ "Field Works," p. 284.

have a certain amount of mobility, and inventors will have to tax their brains to combine absolute stability while firing with a sufficient degree of mobility for transport according to the requirements of the case for each nature of gun. I am not alluding to this subject with a view to raising a discussion on the rival merits of carriages put forward by different makers, but with the object of correcting an impression which may possibly have resulted from the trials of the 6-pr. Nordenfelt Q.F. gun on non-recoiling carriage at Shoeburyness. Many of us will remember the interesting lecture which Mr. Nordenfelt gave in this theatre nearly a year ago on this gun;² the natural impression which most of us carried away being that the gun could be fired at a fixed object without relaying after each round. This possibly was the design, but it appears that the disturbance to the laying is sufficient to necessitate relaying after each shot. I believe, however, that this difficulty is likely to be reduced to a minimum. Passing over this point for the present, we must remember that the fact of having to relay the gun by no means condemns the non-recoiling carriage; it has other and far more important advantages, not the least of these being the power of traversing rapidly without moving the trail, and the saving of labour entailed in "running up" after every round, together with the consequent lessening of exposure both for gun and detachment. I think anyone who has seen 20-prs. or 40-prs. in action will agree with me in saying that the labour of running the guns up after every round is so excessive that it would be impossible to maintain the maximum rate of firing for more than a quarter of an hour. The well-known case of Major Mercer's battery at Waterloo gives point to this argument; after being hotly engaged for some time, and suffering heavily from the enemy's fire, the weakened detachments became so exhausted with the continual "running up" that at last all attempts to keep the guns to their original line was abandoned, the carriages were not run up any more, and they gradually converged to a point in rear until their trails were almost locked together.

There is another most important point in connection with non-recoiling carriages, and that is, the latitude which they afford to a commander in selecting a position: frequently the most favourable position for a battery would entail half the guns being brought into action with their trails downhill; to fire a 12-pr. field gun in such a position simply means that it would bound to the bottom of the slope like a football the moment it was discharged. Again, coming into action in a position where the carriage cannot run back owing to the sticky or swampy nature of the ground, is certain to be attended with injury to the wheels. I remember a 13-pr. battery, with which I was serving last summer at Okehampton, coming into action in such a position; after the second round one of the carriages was disabled owing to the fracture of the tire, one spoke and a felloe, on the lowest wheel (the carriage was on a slope of about 7°).

In the defence of fortified positions we have moreover another

² See Journal, No. 143, vol. xxxii.

important consideration to think of, and that is the advantage which a Q.F. gun on non-recoiling carriage offers in restricted positions where a run back is inadmissible.

I have as far as possible avoided technical considerations, wishing to lay before you to the best of my ability the broad issues at stake, and in no way to confuse the discussion by arguments as to the rival merits of this or that system of Q.F. gun or non-recoiling carriage.

My main contention is that the task of defending our harbours, dockyards, and coaling stations is essentially a military question; that of attacking similar positions belonging to an enemy, and protecting our commerce, a naval question; while in both cases a certain amount of co-operation from the sister Service is necessary to bring about decisive results; that we need not anticipate much difficulty in dealing with an assailant's ships provided we organize our defensive measures liberally and intelligently; and, finally, that the most profitable way of laying out our money in the immediate future is not in any further elaboration of permanent fortification, or in a continuation of the endless struggle for precedence between guns and armour, but rather in the development of frontal fire, the provision of sites for field fortifications in suitable localities, and a sufficient armament of Q.F. guns for defensive purposes, from the proposed intrenched camp round London to the iron and concrete fronts of our great military ports and naval arsenals.

Let us, above all things, never lose sight of the most salient feature in every scheme of defence, viz., that armaments are useless without men, and men of little use without training.

Lord WOLSELEY: Looking around this theatre I see a considerable number of those whom I know have recently made a special study of the subject which has been put before you in such an interesting manner this afternoon. I hope, therefore, that several will do us the favour of conveying to us their views upon this subject, that they will not allow their native shyness to overcome them,—that shyness which is so common to all Englishmen, but especially to the Officers of Her Majesty's Army and Navy.

General Sir GERALD GRAHAM, V.C.: My Lord, I have very little to add to what I think we all agree is a most able and thoughtful lecture. I have heard it with great pleasure, and I can cordially endorse most of the remarks made by the lecturer. I am strongly of opinion that our coaling stations, our dockyards, require fortification at the present time. Unless the science of war has gone backwards it is absolutely necessary to secure the bases of operations, and, as I understand it, the coaling stations and dockyards are the bases of operation for our Fleet. They are the sources of supply, and by fortifying them we leave the Fleet at liberty to undertake offensive operations. That is the principle enunciated by the lecturer, and in that I cordially agree. With regard to the quick-firing gun, I feel convinced that that is the gun of the future; that the objection which at present exists against them, it will be found, on further experience, can be obviated, and for the defence I do not think there is anything better. The principal objections, as have been stated, are the amount of smoke that is involved in quick-firing guns with the present Service powder. That is a great objection, but we hope soon to have smokeless powder, and we may expect that difficulty to be done away with. Then the supply of ammunition is no doubt a very great difficulty for guns in the field, but in a fortress that difficulty is got rid of. The lecturer has given some excellent illustrations of the immense advantage of intensity of fire, as, for instance, in the attack of a torpedo-boat; and all who have seen or heard anything of siege opera-

tions know that the besiegers take care to expose themselves for as short a time as possible; therefore it is of the utmost importance to the defence that the fire for that short time should be of the most intense character. It may be only for a short period that he has the opportunity of firing, as in the narrow passage of a ditch or the rush from the parallel to the assault, and those moments are of inestimable value to him. I think the lecturer has slightly understated the power of quick-firing guns. At present their power is hardly developed. The makers of quick-firing guns have been somewhat held in check by this difficulty of the supply of ammunition, but in the case of the 1½-inch or 3-pr. Maxim the lecturer stated that twenty rounds was about half the normal power of fire. He might have stated it was only one-fifteenth. These guns can fire 300 rounds a minute. Last Saturday they were firing at that rate—fifty rounds in ten seconds.¹ It is probable it will never be wanted to fire more than ten seconds, if you consider that ten seconds may decide a battle.

Captain STONE: What size gun?

Sir GERALD GRAHAM: That was a 1-pr., but I believe Mr. Maxim has got some automatic guns of a larger calibre, which have not yet been fully tried, with which he undertakes to fire 200 rounds a minute. Of course those are still only experimental, but the enormous power of quick-firing guns has not yet been fully developed. I am convinced that they are the guns of the future, and that in defensive operations they will be found of the very highest importance. I think these points have been clearly put forward by the lecturer, as well as the advantages of mobility and of economy.

Lord CHARLES BERESFORD: Lord Wolseley, as you call upon me, my Lord, I am bound to obey, but I am rather sorry, as this is a military lecture, that some of my brother Officers of the Army did not take up the subject first. I must congratulate the gallant Captain who read this lecture most heartily on his paper, because I think it is what I may call a blow in the right direction—in the direction of calling the attention of the public by all the means we can to this question of Imperial Defence. The public are just beginning to be exercised in their minds—not so much as we hope they will be—but they are beginning to be exercised a little on a subject which has exercised the minds of military and naval men for the last eight or ten years, and in paying a compliment, if you will allow me, to the lecturer, I must say how very unprejudiced all his remarks have been, and the remarks of all the military men lately have been of the same character, and all distinguished military men have recognized fairly and fully that the first great question of the defence of this country is the Navy, and they have brought that subject forward first in all their arguments. Whenever the question of invasion has been spoken of by military men—the question of defending the ports with quick-firing and other guns—the arguments have always been based on the assumption that we had lost the command of the sea through having too small a Fleet. I am perfectly certain that I represent the feelings of my brother Officers in saying that we all recognize the thoroughly patriotic spirit in which military men have taken up this question by taking the naval question first, because, remember, the military men have some seventy Members of Parliament, the Navy only five. They are represented at Court, and in the clubs, and society, whereas we naval men are hardly represented at all in the places which hold power and

¹ I had just received this information on a slip of paper from Mr. Nordenfelt, who was present at the experiments referred to, but I made a mistake in supposing him to allude to the 3-pr. The 1-pr. or 37-mm. automatic Maxim will probably be adopted by the French. It has a velocity of 1,320 ft., and can fire 250–300 rounds of shell per minute (on one occasion nearly 400 rounds were fired). The Maxim 3-pr. (semi-automatic) referred to by the lecturer is a 47-mm. (1·85 in.) gun, firing common shell and shrapnel of 3½ lbs. weight. It has a velocity of 2,000 ft., and when tried at Paris sixty rounds were fired in a minute, with good results, as Mr. Nordenfelt informs me. I think, therefore, I was justified in observing that the lecturer had somewhat understated the power of existing quick-firing guns.—G. G.

interest, and we look to the military men to help us in this great question of Imperial Defence. There are a few remarks I should like to make about the paper. I agree almost entirely with everything that Captain Stone has said, except in one or two particulars. I quite agree with what fell from the gallant General, Sir G. Graham, that the first thing we have to think of is to keep up our lines of communication. That is the first thing a soldier or sailor thinks of when at war,—that means, so far as our country goes, the line of communication for our food and raw material. The Fleet has to do that. But, in my humble opinion, the General is perfectly right in saying that the ends of that line of communication should be strongly fortified, that is, the arsenals, the great dockyards, and coaling stations. There is one exception I would take on the question of coaling stations. I have always held that the coaling stations ought to be defended by Marines. I admit it is a great question of argument, but my reason is this: I think in war the coaling stations will come more or less under the command of the Admiral on that station. It is possible there might be a little friction between the Admiral and the General at the coaling station, and that is what we want to avoid. The other reason is that I think it would be far cheaper. Your basis of supply is Imperial, and it must be cheaper to have your basis of supply for the station in the Fleet than it is by the present system. The lecturer called attention to the large amount of shipping—700,000. Three-fourths of those are ships which would come more or less under the denomination of coasting vessels. The real number of ships—steamers—that we have above 100 tons, to keep up our food supply and the supply of raw material by which the workmen get wages, is 5,718, and the French only have 481. And yet I may be allowed to repeat what I have said before that if the French were to lose the whole of their Navy and mercantile marine they would still remain a first-class Power, because they could feed their people; whereas if we lose two battle ships our food supply might be stopped, and our raw material. I am diverging from the subject a little, but it is to try to bring whatever influence I can to bear on this question of the coast defence, supported by the quick-firing guns that the lecturer has brought before us to-day. The lecturer says that the rôle of the Navy should be purely offensive. I entirely agree, but he has put down here a definite idea, and it is this want of a definite idea that we suffer from in both Services. We ought to put down, as he has done, what we have to defend and how we are going to defend it, and until we do that I am afraid we shall never get anything really satisfactory for the defence of the Empire. The lecturer said that not a single Egyptian gun was disabled at Meks. I do not think he is quite correct in that. No doubt the fort was an old-fashioned one, but it is the best fort in the world for defence, because it is so difficult to hit. It is such a small target. A barbette fort is the most difficult fort to hurt, because to hurt it you must put its guns out of action, and where you have only a gun pointing over the top of the fort you have to put your shot into the muzzle of that gun to put it out of action. If he is firing at you all the time it rather disconcerts your aim, and your shot will either hit the parapet or go right over the top. The difficulty of taking a fort of that description by assault, if it had quick-firing guns, to my mind is perfectly clear; I should say it is almost impossible, if it is armed in the way the lecturer advocates. I also agree entirely with the lecturer in the question of a number of small projectiles being a great deal better than one large one, and for my own part—of course I may be corrected by my military brother Officers, who know more about it than I do—but if I had to work a battery on shore I would rather have two batteries of twelve 3-prs. than one battery of six 6-prs., because I think the moral effect would be very much better and you would more quickly gain your object in view. I know our noble Chairman has very strong views on the question of smokeless and noiseless powder, and for my own part I can say I believe that when we do get the noiseless and smokeless powder, if we get the machine-gun and quick-firing gun generally, not only for defence but for offence, I believe it will revolutionize warfare altogether on the land. I would congratulate the gallant lecturer on a very strong sentence in which he says he hopes we shall divest ourselves of all party feeling and prejudice on this question of defence. I did my best to say what my thoughts, and I think the thoughts of my brother Officers, are with reference to the line the soldiers have taken in this question, and I am very glad he put that in

the paper, because it shows the line I believe everybody in this room and outside intend to take on the matter. I must differ, however, with the gallant lecturer on the suggestion that he puts here, that the "sailor loves his ship." He ought to, because he lives by it; but he says he thinks he puts his guns in the second place. Well, he did, we are quite agreed, but nowadays he puts the guns in the first place, because what he did with his canvas before, he now has to do with his engines. What we want is the man who can put his ship in the best position to fire the guns, but when it is in that position you want the very best gunners you have got to settle your enemies with despatch. The great argument the lecturer brought forward, in my opinion, on the question of quick-firing guns, is contained in the clause in which he says that it is a gun that will do the maximum of work in the minimum of time, and that is exactly what the quick-firing gun does do. There is one more remark I should like to make. Just at the bottom of page 10 the lecturer says, "But where are the guns to come from?" Well, that is a question that I think exercises a great many minds at this moment, and, in my humble opinion, till we get hold of this question of the gun supply, and until we get rid of all this political nonsense that we hear talked about this question of the guns, this deficit will exist. This country can produce the guns. We ought to employ more firms and to give them time to make the guns. A firm gets an order for a certain amount of guns, and it has to do it in a certain time. Therefore, out of twelve months in the year probably it only works five, and they have to turn off the workmen for the time or to work for foreign Governments. The orders are given late in the financial year, and have to be finished by the end of the financial year. It is not done in a business-like way, and I think I shall have the approval of the Officers of both Services if I do my best in the House of Commons to wake the country up on this question of the guns. Even if we have the best ships, the best men, the finest brigades, and the best Generals, they are perfectly useless unless you can put something into their hands and enable them to fight. The lecturer's concluding remarks I most entirely agree with, when he says that "armaments are useless without men, and men of little use without training." As to the question of training, another question ought to enter into our calculations, more particularly with regard to the coast defence, for which this quick-firing gun will be probably more applicable. My own humble opinion is that it is entirely auxiliary, or should be. First get your Fleet in order, then your ports and arsenals fortified, if possible, at the same time; but, every pound you spend on your Fleet or ports and arsenals is worth 3,000% spent on the question of coast defence for certain localities, even for the object which they wish to gain, because it is no use defending certain localities which may never be hit at all, and would never be hit if your Fleet were big enough to adopt a definite plan of campaign, which is to watch, and, if possible, destroy every one of the ships of the enemy.

Colonel W. W. KNOLLYS: The lecturer spoke of the patriotic feeling of the Army in saying that they, both in public and in the newspapers, would urge above all things attention to the Fleet. There is no doubt the Fleet is the most important—far more important than the Army. At the same time I am glad to find that he struck a blow at a certain heresy which makes us talk of the Navy as if it were not only our first line of defence, which it is, but as if it were our only line of defence—as if the Army were to be completely neglected. I think Captain Stone helped to disperse that error. With regard to his remark that it would be impolitic and foolish to keep our Fleet hugging our shore: it seems to me that it would be a terrible waste of mobility to do so. Having said that, I have only a few more remarks to make on Captain Stone's paper. In speaking of the quick-firing guns he omitted to mention one point, which is that on account of their great mobility they will largely facilitate siege operations. Everybody who has studied the history of sieges knows how much the work consists in dragging the guns from the roads over rough and soft ground, and sometimes through trenches, to the batteries; that operation will be greatly facilitated by having these comparatively light guns. I should like to ask the Engineers their opinion, in the face of the extreme ranges of these new magazine guns of ours. I saw them firing at Aldershot at 2,800 yards. With respect to the first parallel: now the first parallel is spoken of as about a mile distant from the place, and it seems to me that the new magazine rifle in the hands of trained men

would make it very unpleasant both to those who are building the battery and also for those who are working the battery when constructed. Another remark was made by Captain Stone with reference to counterscarp galleries. I would ask, does he not think it somewhat obsolete? I can hardly believe in these days you can expect any men to fight with much determination in a counterscarp gallery where, unless you have got an elaborate system of underground communication, they will be cut off and killed or captured. Then he referred to improvised works round London, and very justly cast discredit upon any idea of defending London by such means. Is it necessary that these works should be improvised? Should we not have a plan carefully worked out, fixing boundaries, sunken stones to mark the angles of works, and in every district having drawn up on paper, profiles, number of men, provision for tools, and details of men who are to work, to construct, and also to man these field works? Should that not be done? It cannot be too much impressed upon the public that the best men to construct field works are the men who have to defend them. I cannot but think so, and I dare say it is so—very properly we are kept in the dark about that—but if all the arrangements, all the tracings and estimates of works, positions, minute details of these field works for the protection of London have not yet been worked out, I cannot but think that it is absolutely necessary to work them out.

Mr. NORDENFELT: My Lord, the lecturer will allow me to say a word to remove a possible misapprehension that might arise from a statement with regard to what I may call "officialism," though I am sure he did not mean it, nor that any of us would misunderstand him. What he complained of as to the possible want of interest in modern inventions and in driving forward improvements, did exist a good many years ago, but the last few years, under the *ægis* of the illustrious President of this Society, there has been a very distinct change in that matter. Of course it may be said that the majority is very likely against my view. If ten men produce guns for the same object, nine of them are the majority who are very apt to say hard words of the Committee that decides, or to the one man who has happened to get in. When I have been out in the cold I have sometimes felt sore about it. But I am sure that we must all fully admit that Officers in this country who attend to these questions have nothing else at heart but the full and fair advancement of the interests of the country. In one thing I join issue with the lecturer. He mentioned the words "complicated machinery" with reference to quick-firing guns. There has been an idea that quick-firing guns are complicated, but I beg absolutely to deny this. A quick-firing gun, be it a 3-, 6-, or 14-pr., is distinctly and absolutely more simple in mechanism than the ordinary breech-loading gun. I am prepared to prove it by putting the mechanisms on the table and comparing them piece by piece, and I shall prove that our quick-firing guns are very much simpler than the ordinary field-guns. Captain Stone mentions that from Shoeburyness experiments they have found out that quick-firing 6-pr. guns do not stand sufficiently still to fire without adjusting the aim. That is quite true, but I never said they would always do so. There are a great many uses for quick-firing guns, and when quick-firing guns are mounted in disappearing turrets, in caponiers, or on siege gun carriages, which need not move very quickly, they can be fired in series with little or no adjustment. But when they are mounted on field carriages specially made light for the purpose of being easily run back from outlying forts, then the carriage does move slightly, or the vibration of the weapon makes it necessary to readjust the aim, and I found the clever gunners at Shoeburyness fire almost as quickly when they relaid as we did when we did not relay. I do not mean to say that gunners in the field have as great training as the Shoeburyness gunners have, but the gain of being able to move the gun for certain purposes is certainly greater than the advantage of being able to fire repeated shots without relaying. Experiments were made last year at Okehampton with shrapnel with percussion fuzes, and it would be exceedingly useful for all concerned if some day the results were made known. I am delighted that a "real live gunner" has taken up the question before us and has given such an excellent lecture. Not many years ago, when I came to Artillery Officers, they said, "You are a very nice fellow, but we don't want you." Nowadays we hear from every quarter the cry of "Guns! guns! quick-firing guns! small guns!" and, therefore, naturally, besides the great pleasure I personally have in hearing it, I am quite sure it is

useful. I would like to add a word to what Lord Charles Beresford said just now about getting guns made. There is not the slightest difficulty in getting guns. If the Government would dare to face the Chancellor of the Exchequer for the time being, and put before him a scheme by which you could utilize your tools and men and labour as they exist—if, instead of every gun having to be delivered by the 31st March, in order that Mr. Conybeare and other gentlemen may exercise the right of, as they call it, “controlling the expenditure”; if, instead of doing so an order were spread over a couple of years, there is not the slightest difficulty in getting guns. But what happens is that this Parliamentary control prevents not only the tools of this country but the men from doing any work for on an average five or six months out of twelve. As to the question of twelve 3-prs. against six 6-prs., I do not go quite so far as Lord Charles Beresford, but I would like twelve quick-firing 3-prs. against six ordinary breech-loading field-guns, and I quite agree with smaller shell; in many instances you can fire more quickly with more effect, but the 3-pr. and 6-pr. of the same class of gun are both very handy weapons. Of course when you come to larger weights there is a greater difference. Sir Andrew Clarke, the late Inspector-General of Fortifications, told me once, “Quick-firing guns will come in some day, only we cannot get the money for them now,” and he very strongly backed up my idea that these guns should not be placed in batteries or anywhere near the big guns, but hundreds of yards right and left, or up the hillsides, so that the enemy would not take the trouble to find the range for them, and that they would not be hit by badly-aimed shots aimed at the larger fortifications. In those positions they would be very useful, and would make it very difficult for the crews of the enemy’s ships to handle their guns. For land forts there are three distinct objects for the use of quick-firing guns. For the defence of ditches (caponiers), for disappearing turrets, and for ramparts, there must be guns that can be run about to any part of the fort that might be suddenly attacked. Taking the averages of all these things, I believe the 6-pr. is the most useful. They fire very quickly. If you put up a battery of six 6-pr. guns they will fire *in one minute* either 25,000 lead bullets out of shrapnel for long range fire, or 60,000 lead bullets out of case shot for short ranges. Six guns will fire in one minute 60,000 bullets. Unless these figures are really understood, one does not quite see the real value of quick-firing guns. The accuracy in the same way is very much greater than appears at first sight. I do not want to praise our guns, but I want to draw attention to the fact of their firing accuracy. We fired at Vienna at 1,100 yards with 6-pr. shrapnel; and in 21 seconds hit 159 men out of 180 marked on three targets. At 2,200 yards we hit 123 men out of 180 in one minute from one gun and one man firing. I think that gives clearly the idea that the maximum work in the minimum time must under certain given circumstances be not only desirable but absolutely necessary, and the sooner that point is faced the better. Not only must the country provide quick-firing guns for actual requirements, but the country must be made to realize the enormous risks we run in case of a serious reverse in war if the War Office has not large numbers of guns in reserve fully ready to replace those lost in battle; it must be made quite clear to the House of Commons that modern wars will be so short, that it will be absolutely impossible to make many new guns while the war continues. Where are our reserve guns at this moment?

LORD WOLSELEY: Before I ask the next gentleman to speak I should like Mr. Nordenfelt to give us a little information on a point of very serious importance. We have heard a great deal about the effects and accuracy of field-guns, but no one has told us what quick-firing guns are actually in existence. I believe there are a number of 6-prs. I have heard of 9- and 14-prs., but I should like to hear from Mr. Nordenfelt, who is such a great authority on this subject, how many quick-firing guns he has made for our Government, and what is the character of those guns which have passed beyond the experimental stage. I do not refer to experimental guns, but to guns actually ready for use that have been already supplied for the public service.

MR. NORDENFELT: Guns actually ready for use and beyond experimental stage, of larger types than rifle calibre machine guns are the following: 1-inch machine guns; 1½-inch (1-pr.) automatic guns; 3-pr. ordinary quick-firing guns, Hotchkiss’ and my own, or the automatic hand-loading Maxim gun, which fire ordinary shell,

ring shell, or shrapnel. There are 6-prs. for several different purposes, for sea ports and land forts, firing shrapnel, ordinary shell, and case shot, and the Nordenfelt 3-inch 14-pr. high velocity gun. Then there is the Armstrong gun, the shell weight of which seems not to have been definitely fixed, between 36-, 40-, and 45-pr.

Lord WOLSELEY: Are these experimental guns?

Mr. NORDENFELT: They are, I believe, experimental so far as weight of shell is concerned, but they have been fired on board the "Excellent," and they have been fired at sea. I understand practically they have been adopted by the Navy. There is also the 8-pr. Nordenfelt gun for field use; they are not specially for fixed fortifications but rather for horse artillery guns to follow cavalry. The 14-pr. Nordenfelt has been adopted by the Colonies and abroad, and the Government has bought one 8-pr. from me, which I believe is going to be fired next month; it is in full preparation for field use, carriage, limber, and everything complete, and that is all. There are as yet no bigger guns which can be said to be ready, though we are making 5-inch and 6-inch quick-firing and automatic guns.

Captain WILLOUGHBY VERNER, Rifle Brigade: Lord Charles Beresford referred to the waste of money which it would be, were we to go in for stationary coast batteries before we had properly armed our fortresses and coaling places. It seems to me that that is a very true remark, but it raises the question that in these quick-firing guns we have a gun whose mobility and whose easy capabilities of being worked in a limited space make it peculiarly adapted for a mobile system of coast defence, either in the vicinity of our fortresses, or to oppose a landing on our coast. Captain Stone has told us how the 3-pr. quick-firing gun has a penetration of 4 inches into wrought-iron, and I understand that Mr. Maxim's new semi-automatic 14-pr. quick-firing gun has a penetration of no less than 8 inches. It appears to me that, with such a penetration, any vessel which was not sufficiently armoured to withstand these projectiles would have a very bad time of it if she attempted an attack of the Paul Jones type in our next maritime war at any part of the coast in the vicinity of which such guns happened to be stationed. Not only are these guns, by reason of their exceptional powers of penetration, well adapted for coast defence purposes, but owing to the practical absence of recoil they could be used in situations where ordinary field or siege guns could not be served. Take, for example, the stretch of coast on our southern shores for a good many miles where there is a sea-wall protecting the low-lying ground from the irruption of high tides. Along this section of the coast, except at a very few points, it would be impossible to bring field-guns into action, since this sea-wall is too high to fire from behind, and is not wide enough on the top to permit of working guns, not to speak of the exposure of the guns. Now, at very slight trouble, field emplacements for working quick-firing guns along this stretch of coast could be readily made at various points, especially at places where existing ramps conduct from the high road in rear of the wall to its top. I believe I am correct in stating that there is no more difficulty in moving a quick-firing gun on a travelling carriage than an ordinary siege gun, say a 25-pr., and assuming that they can be moved at a minimum rate of even three miles an hour along a road, it is obvious that they could be brought to the required point and be used with effect anywhere along the section of coast I have indicated. Should a landing ever be attempted on our southern shores there is always this chance, that it may be carried out by beaching the merchant steamers conveying troops, and thus obviating all the risks and delays of a boat landing. Vessels so engaged would be certain to be armed with quick-firing guns, and hence they must naturally be met by similar weapons. That this operation of beaching vessels is a perfectly practicable one is, I think, well known to many naval men. A considerable number of large vessels have at different times run ashore on the part of the coast I have alluded to. In some cases they have beached themselves bow on, and run up the "full," so as to be left high and dry by the receding tide, and in almost every instance they have been got off undamaged. In one case, some years since, a sailor graphically described it to me by saying that he stepped over the bow into a grass field. I believe quick-firing guns in such an emergency as a landing of this type would be most valuable, as they could either smash in the bows of an advancing vessel and sink her, or, reserving their fire until she took the ground, annihilate the troops who attempted to leave her. I

have recently ventured to advocate the armament of our Volunteers with Maxim machine-guns for coast defence, and I would like to go further and suggest that a proportion of quick-firing guns should also be placed at their disposal. The objections made to the difficulties of transporting sufficient ammunition for these guns would hold with less force in such a case as coast defence than in any other, for depôts of ammunition might be collected at certain places along the coast, and the numerous good roads which exist almost everywhere in England would render the transport of ammunition to the required spot no very great difficulty. It has been argued, also, that it is not advisable to place such elaborate machines as quick-firing guns in the hands of our Volunteers, but I think that those who say so overlook the fact that for troops who have not the advantage of continuous training what is required above all things is simplicity of service. Simplicity of construction is an excellent thing no doubt, but if the mechanism of an automatic or semi-automatic gun be so constructed as to be capable of standing extended experiments in a satisfactory manner it ought to be good enough to put in the hands of our Volunteers without much apprehension. Many of us use hammerless guns for shooting game on account of the extreme rapidity and simplicity of service. To be logical, if we object to quick-firing guns we should discard our hammerless guns and revert to muzzle-loaders and shot flasks. One thing is certain, there can be no comparison between the simplicity of serving a quick-firing gun and the process of working an ordinary artillery piece. Although I have mentioned Volunteers, I of course do not wish to be understood to advocate that they alone should be supplied with these guns, which latter, in my humble opinion, should form a part of the defensive system of our fortresses, fortified places, and last, not least, of our coasts.

Lieut.-Colonel L. K. SCOTT, R.E.: I did not come here, my Lord, to speak. I agree, however, with everything that the lecturer has said with reference to the important advantages of quick-firing guns under certain conditions, and therefore I cannot add much to it except to say this: Captain Stone referred to the Watkin position-finder being employed in connection with quick-firing guns, and I understood him to say that these quick-firing guns should be placed in position out of view of the enemy, and behind cover in such a manner that they would be entirely dependent on the observer at the Watkin position-finder for their laying. Now, I myself do not think that guns are placed in an effective position for coast defence, unless the water to be protected by them can at the same time be seen from their own sights, because although the Watkin position-finder is no doubt a very admirable and clever invention, and a very good thing indeed for the purpose of firing guns in groups, yet fogs or smoke might at any time obstruct the view of the observer in the conning tower, and at the same time not interfere with the view from all of the guns themselves; therefore if the guns can only be fired in groups by the Watkin position-finder and they are so placed as to be deprived of independent action and of the use of their own sights, it stands to reason that we should on occasions lose the defensive power of our battery.

Major F. BARKER, R.A.: The lecturer made one or two observations that I think are somewhat discouraging to the Services, and might possibly be rather misleading. He mentioned the accuracy which the gun was capable of arriving at, but he stated that the powder used in the Service was bad.¹ Well, as the gunpowder is the propelling agent on which the guns are dependent for their power, if it be bad I fear that our country is not in a very satisfactory condition as regards its defences. I submit that, although the lecturer made this remark, and though possibly it may be found that there is a good deal to be said against the Service gunpowder, yet it can hardly be called bad. First and foremost I would invite the attention of members to that admirably compiled diagram which we have before us. The results therein quoted are fairly satisfactory, and the accuracy obtained cannot be complained of. But it is totally dependent on that small word that we see above, "charge," that being "Service" powder, the propelling agent which drives the projectile to the

¹ It has been shown in the reply that this referred to the amount of smoke, and not to the quality of the powder.—ED.

range required. There is just this to be said. There is a grave objection to the powder as at present used, and that is the smoke that it produces. That subject is being carefully considered and gone into, and to get rid of it is the object of those who are employed in making gunpowder. One thing that I submit to those present is that the gunpowder at present employed gives accurate results, which compare favourably with those which could be obtained if steam or any other propelling agent were employed, that is to say, you get a projectile to go at the rate of about 1,250 miles an hour, with a mean deviation or inaccuracy of velocity of about 10 feet a second.¹ Those results are necessary before the powder is accepted into the Service, and I think they can hardly be called bad in the propelling agent which is now employed. The lecturer was also good enough to mention a very enterprising firm for which we all have the greatest respect, the Chilworth Company, and the powder which they are manufacturing at present. We know its composition; it has advantages, and we know that there is a certain less amount of smoke produced by it than what is commonly called the new Service powder, but it has one grave objection which all of us who serve ought to keep before us. You store what is called the Service powder. It is made to withstand climate, ordinary moisture, heat or cold, and also to be submitted to extremes of temperature without much injury. We have all of us, who are engaged in investigating and making gunpowder, seen the Chilworth powder. After that powder has been exposed to the atmosphere for a very short time it will become of the constituency of mud, and absolutely unserviceable for the usual requirements of gunpowder; it will not project a shot, it will not make any projectile leave the muzzle, and from mere exposure to extremes of temperature and climatic moisture it becomes absolutely unserviceable. We must remember this before we adopt any proposal, however it may be recommended by those who are promoting it. For that reason I just wish to submit to you, my

¹ The new (or modern) gunpowder must fulfil the following conditions at proof (three rounds being fired from each lot) before acceptance into the Service:—

Nature of powder, charge, &c.	Muzzle velocity to be imparted to projectile.	Mean deviation not to exceed	Pressure to be under
Prism ¹ E.X.E., 48 lb. charge, 100 lb. projectile.....	1,960 to 2,000	10 ft. velocity	tons. 17·5
Prism ¹ S.B.C. (slow-burning cocoa), 360 lb. charge, 655 lb. projectile.....	2,010 „ 2,050	„	16·5

And the following results of firing recently manufactured Service powders show how fully these conditions are fulfilled, and what uniform and reliable propelling agents they are:—

Nature of powder, charge, &c.	Muzzle velocity.	Deviation from mean.	Pressure in tons per sq. in.
E.X.E., Lot 74, fired Nov. 16, 1888, charge 48 lb., shot 100 lb.	{ 1,977 1,983 1,970	0 6 7	16·5 16·3 16·7
S.B.C., Lot 80, fired Dec. 28, 1888, charge 360 lb., shot 655 lb.	{ 2,030 2,028 2,028	1 1 1	16·5 16·3 16·7

Lord, and to those present, the desirability of considering these new claims for gun-powder before rashly adopting them, to the possible detriment of our forces when engaged in action either here or in foreign lands.

Colonel J. P. RICHARDSON: The lecturer has selected Plymouth as one of his instances of a naval attack. Now I happen to be answerable for the artillery defence of that fortress, and, though I agree entirely with him in the desirability of quick-firing guns, I do not think we ought altogether to exalt them at the expense of everything that has been of very good service to us so far. I doubt altogether whether we are so utterly defenceless there as is represented. Although we have no quick-firing guns, and long for them very much indeed, still I believe the place is capable of defence against anything but a very prolonged and determined attack. I also think that the lecturer has not quite hit on all the good quick-firing guns would do for us, taking Plymouth as an instance. He has named the position-finder, and given a fairly accurate description of its use there, but the quick-firer might help us in another way. The last speaker referred to the excellence of the Service powder. The powder may be very good indeed (that diagram shows very even results), but powder kept different times in magazines will send projectiles varying lengths, and the lecturer is wrong when he says that with the position-finder you will "hit without fail." If the powder always threw projectiles to the same place each round, possibly it might enable us to hit without fail, but why we cannot hit without fail with the position-finder, is want of practice. It is out of reason that the country should stand our firing big guns continually to obtain the amount of practice required, but I believe the quick-firer can give us the very thing we want in that way. The quick-firer could be placed inside the bores (I have no doubt that Mr. Nordenfolt would supply us with the means of doing it) of the big guns and used to fire projectiles for the position-finder to range itself by. I take exception altogether to cracking up one gun at the expense of others equally useful. Now the lecturer, for the purposes of comparison, has produced very old facts in dealing with the 8-inch howitzer, old tables and old results, and has compared them with the quick-firer, which is so new that you, my Lord, hardly knew in what form it existed in the Service. That I think is hardly fair. He went back a great many years. Last year and the year before we deduced the rule that from 2,400 to 3,000 yards we could breach an earthen parapet at the rate of about one round to one foot of parapet, counting misses and everything; yet the lecturer talked about getting up to 1,200 yards and 1,700 yards as being necessary for effect. With improvements tried last year in the direction of allowing the howitzer to recoil in the direction of its axis, we shall probably be able to do the same amount of work at from 4,000 to 4,500 yards, which will altogether take us out of the range of musketry fire, though not out of that of the quick-firing gun. It will be very difficult for the quick-firing gun to strike people almost like moles in the earth, which men working the howitzers are. The quick-firing gun has all the defects in firing at people behind earth that high velocity guns have. When firing at gun emplacements it has absolutely no effect on people at all protected by earthen cover, whereas howitzer fire has. If we could get a quick-firing howitzer that would drop with a very low charge its shell into trenches, we should have a most valuable weapon for defence. For the attack the big howitzer will still hold its own. That is proved, because if we employ small howitzers for the destruction of earth-works and matériel we do not get anything like the result that we get out of the big ones, weight for weight of ammunition. The lecturer spoke of penetrating iron with quick-firing guns, but he did not tell us, in the instances he gives, at what distance from the muzzle the penetrations are obtained. I think rather close. For flank defences I believe the quick-firer may be most excellent. It will be invaluable for the defence of mine-fields, but I do not think it will advance its cause to claim for it what it really cannot do.

Captain P. H. SALUSBURY: I will confine myself to a very few remarks, although the lecturer and other gentlemen who have spoken on this subject have afforded us a field for much consideration hereafter, and for much comment and remark—more than can be contained within the ten minutes permitted—which comment and remark may perhaps be devoted to it by those who, like myself, often dabble in pen and ink. *That* may be done hereafter, also. But there are one or two points I

should like to address this meeting upon. I think, perhaps, the very title of the lecture has been somewhat misleading. The lecturer has called his lecture an Essay upon Quick-firing Guns, and has at once barred the quickest firing of all guns from discussion, inasmuch as he deals with shell-firing guns rather than bullet; otherwise, I believe we might have heard something interesting about such a machine-gun as our old friend the Gatling, in which I have a sentimental interest.

LORD WOLSELEY: If I might say so, I am sure the spirit of the meeting is that we do not wish to enter into the subject of machine-guns at all, but to confine ourselves entirely to the definition given of quick-firing guns by the lecturer.

CAPTAIN SALISBURY: Then I would simply urge that no gun should be chosen unless it has been subjected previously to trial with whatever rival may have started up in order to oppose and, if possible, gain the victory over it. The money that has been wasted in this country has been over guns that have been ordered without trial. I hope, therefore, the noble Lord who sits opposite (Lord Charles Beresford) will take care from his place in the House of Commons that neither this nor that quick-firing gun shall be adopted without competitive trials first of all.

COLONEL HARRINGTON STUART: I shall only make one or two remarks, entirely of a practical nature. I have listened with deep attention and interest to this lecture, as one of those coming from a locality very deeply interested in coast defence, where I have the honour of commanding a battalion of Volunteers. I should not have risen had it not been for a remark which fell from Captain Verner of the Rifle Brigade, in whose regiment I had formerly the pleasure of serving, with regard to the serving out of quick-firing guns to Volunteers. I think there need be no hesitation in serving out these guns as far as the intelligence of Volunteers is concerned. If quick-firing guns are certainly to play an important rôle in future wars, which undoubtedly they will, I think the sooner the Volunteers, to whose hands to a considerable extent I believe the defences of the country are supposed to be intrusted, have a certain number of these guns served out to them, say, one or two even to each regiment, so that they might become familiar with the working, the better. A great many other things have been referred to connected with these guns. General Graham alluded to the supply of ammunition, which is a very important matter. It is a point which has not been sufficiently considered—the enormous addition to the amount of ammunition which these quick-firing guns will entail, if they are to be made use of to any large extent. I may say that even the repeating rifle will raise another question with regard to the supply of ammunition. We shall have to have different kinds of ammunition carts to what are now used; they will be required to hold a much larger supply and will have to be made differently. They will have to be strong and at the same time easily moved; they must have greater mobility. There is no doubt expense is the most serious matter of all. We seem to be all agreed as to what is to be the nature of the coast defence. There has been lately a deputation to Lord Salisbury in which my district, that of the Clyde, was represented. He did not give an altogether unfavourable reception to that deputation, but the Government should understand that they must go to a considerable expense. No doubt they have a great deal to do; we must not expect too much of them, but the point must be faced that our coasts and the mouths of our principal rivers must be put in a proper state of defence. I hope our noble Chairman will do his best to impress this upon the Government.

GENERAL SIR LOTHIAN NICHOLSON, R.E., Inspector-General of Fortifications: My Lord and gentlemen, the lecture that Captain Stone has delivered has been undoubtedly one of great interest, but it seems to me to unite two parts of this great subject. He deals with prehistoric days, and he gave a forecast of the future which one might almost call prophetic. There is no doubt that in modern times we have come to see that the old stone forts and armoured forts must be considered as things of the past. Now, my friend Captain Stone deals with them as if they were things of the present. We now treat guns in the way that he indicates. We try to disguise them, but I do think we go beyond even his prophetic times, because we make the gun sink into the ground and they are not even *en barbette*, except under certain conditions. Lord Charles Beresford has told you that the barbette gun is a gun which it is "almost impossible to

see." Well, gentlemen, the gun that we now mount is one that it is impossible to see, without the "almost." Therefore, with regard to what we are doing in the way of fortifications at the present time, what the lecturer has told you is, I may say, rather misleading. I do not like to discourage anybody who takes the trouble to study this important subject; my business is rather to encourage, not only the men of the Engineers and the men of the Artillery, but also try to make civilians take that interest in the subject which ought to be in the heart of every patriotic man. Ten minutes is but a short time to give a man to speak upon so large a subject, and therefore I must try to confine myself to what the lecturer has brought before you. At the same time, though perhaps it may be a collateral subject, I do not think it would be quite right, occupying the position that I do, to pass over Lord Charles Beresford's remarks without comment, though I feel that I ought to speak more on general lines than from the purely official point of view. He and others have touched upon the question of naval defence. Now, I feel very strongly that if this country is ever to make a real and valid defence the only way that that defence can be carried out is by an understanding and a cordial co-operation between the Government, the Navy, the Army, and the civilians. Unless we soldiers take to our hearts the fact that the great strength of England is in the Navy, unless we at once realize that fact, unless we bring the Navy to the front, a fatal day, in my opinion, may, at some future time, dawn upon our shores. The strength of the Navy lies in its power of defence for offensive measures. Those are the principles upon which I and my coadjutor act in deliberating upon the present question of coast defence. I say that advisedly, and I am quite certain Lord Wolseley will agree with me and support me in that view. Now, though that is the case, we also feel that in order that the Navy may have its homes, in order that the ends of the lines—very aptly called the ends of the ropes—may be kept well taut home to their centres of coal supply, the coaling stations are the stations which we are bound to defend. We are bound also to protect to a certain extent the estuaries of our rivers and harbours, but that should not be carried too far. That should be secured to a perfectly conceivable extent by a few cruisers, but not to the point of impregnable defence such as some people seem to think we Engineers deem necessary. On the part of my brother Officers I entirely ignore such a theory as that; that is not the principle upon which we are going. The general view of quick-firing guns is not as the lecturer would try and make us believe; I do not mean to say that he would deviate from what he in his heart believes, but it rather leads to the supposition that the importance of quick-firing guns has not been appreciated, so far that quick-firing guns are a part and parcel, and a most important part of the defences that we are at the present time devising and constructing. If they have not been introduced into the Service the reason is not that the Navy, not that the Army, have not asked for the guns, but because the money is not forthcoming to buy them; this is the real reason. We know perfectly well what is necessary for the defence of the country, but we are not able to get the wherewithal to render those defences as perfect as they should be, and you must not go away with the impression that sailors, soldiers, engineers, and artillerymen are blind to the use of quick-firing guns. Far from it, we are doing everything we can to plant those guns in all our fortresses. At this moment we have taken up estimates for supplying quick-firing guns to every place, and fortresses are being defended very much upon the lines which the lecturer indicates. We are placing our guns on high levels, and as far as sites will admit, dispersing them. Can anything be more satisfactory than that? We are, in fact, in agreement already with what the lecturer tells us we ought to do. That is the line that we are taking, and I think you will all go away from here feeling that at any rate the Engineers are not blind to the necessities of the times we live in. There are one or two minor details referred to by the lecturer and others on which I should like to express my opinion. Colonel Knollys is I think under some misapprehension regarding the value of counterscarp galleries, and seems to think that those who occupy them would be left without access to the work, but such is far from being the case; and the lecturer told you the 32-pr. gun is being used and recommended to be used in the defence of ditches, and he rather drew a comparison between that gun and other guns of an obsolete nature, as if, because the other guns were obsolete, that must be obsolete also. That is very far

from being the case. This is a technical matter which only those technically trained will understand; but I should like to tell the lecturer that the 32-pr. which is being mounted in some places has been found by experiment to be even a better gun, altered as it is with breech-loading apparatus, than the quick-firing gun. No one should be under the impression that our fortresses are going to be armed with obsolete guns. Far from that, the obsolete guns are disappearing everywhere. We are applying to those gentlemen who are kind enough, like Mr. Nordenfelt, to assist us with new inventions. We take advantage of their brains, we pump them as much as we can, and we use every invention they are bringing forward before this country, and as long as they are good enough to help us, you may depend upon it that we, with Lord Wolseley at our head, do all we can to assist the country to become as invulnerable as every patriotic Englishman and woman some day hopes to see it.

Admiral BOYS: With regard to the difference between the machine-gun and the quick-firing gun, the lecturer's definition was that the machine-gun fires bullets and the quick-firing gun fires shell only. I think that is not quite correct.

Captain STONE: It is not quite correct, because the quick-firing gun fires case.

Admiral BOYS: I think one type of machine-gun fires a shell: and now I am up I may remark that I understood Colonel Richardson to express the idea that quick-firing guns were all high velocity guns. Now the 6-pr. caponier gun—

Colonel RICHARDSON: I did not say that—the lecturer spoke of the 6-pr. as a high velocity gun.

Admiral BOYS: I can assure those present that the quick-firing 6-pr. caponier gun, which is I believe approved by the Belgian Government, is not a high velocity gun, and that there is no difficulty in constructing a quick-firing gun of low velocity or a quick-firing howitzer. As a naval Officer I might say one word more, viz.: that if I were a younger man in command of a cruiser, and it became my duty to attack a vulnerable position on an enemy's coast that was partially defended, I would much prefer to find pointing at me the muzzles of ordinary guns than the same number of quick-firing guns of the present day.

Captain STONE, in reply, said: Sir Gerald Graham observed that I had understated the rate of firing of the 3-pr. Maxim gun. I think there was some slight misconception upon that point, and I believe the rate of firing which Sir Gerald Graham actually quoted was that of the 1-pr. The Maxim *automatic* system admits of a much higher rate than I have quoted; but the rate so obtained is unnecessarily high, and the *semi-automatic* system, owing to greater simplicity, is more in favour for all guns, except the 1-pr. Lord Charles Beresford says that the coaling stations should be defended by Marines. In this I am quite prepared to agree, and I think the argument of the defence by the Navy is most sound. His lordship further says that the number of ships which I quoted is not quite correct, in fact very far from correct, and gives the number of ships as 5,718, deducting coast-guard vessels, and so on. But the total which I gave of 700,000 is the number of British ships which enter or leave our ports annually, so that the same ships may possibly be quoted four times over. It is merely to illustrate the extent of the traffic, not the exact number of the ships.

Lord CHARLES BERESFORD: I said the number of British steamers over 100 tons is 5,718. I compared that with the 481 of the French over 100 tons.

Captain STONE: I beg his lordship's pardon, I evidently misunderstood him. The next point was that the sailor now puts the gun in the first place, and by so doing he shows that the Navy is quite free from prejudice. Lord Charles Beresford further makes a strong point by saying that gun-makers are not dealt with on sound business principles by the Navy. This is not for me to enter upon of course, but the episode about Messrs. Wilkinson and the sword blades which has lately been in the papers will tend to explain that matter. With regard to the guns actually supplied, and the want of them, I believe the Government entered into a partnership with some of the Colonies about their defence, the arrangement being that the Colonies were to make the defences and the Government to supply the guns. I am told by gentlemen who have lately come from the Cape of Good Hope that the defences have been ready for some time, but the guns are not yet there. Colonel Knollys said I omitted to mention the point of mobility, with

regard to the quick-firing gun, but I think if he refers to my lecture he will find that it is one point that I lay great stress upon.

Colonel KNOLLYS: The siege battery?

Captain STONE: I meant to imply that, though possibly I have not expressed myself accurately. He says that probably the first parallel would have to be taken to a further distance, owing to the improvements in rifles; that, no doubt, will have to be the case. The distance taken up theoretically is already greater than it formerly was practically. Of course, when we come to blows, it may have to be further still. With regard to the defence of London and the employment of the men who have to fight in the various positions, I think Colonel Knollys enunciates one of the most important principles on which every field defence should be based. Mr. Nordenfelt says that official opposition has practically ceased to exist. Nobody can be more pleased than Mr. Nordenfelt and other manufacturers that this is so. I was thinking, to tell the truth, not only of official opposition, but also of the opposition of certain people who will not go with the times, whether they be in official positions or not. For simplicity of service, which is after all the great thing, nothing can compete with the quick-firing gun. There is a small working model of Mr. Nordenfelt's gun which I have been able to secure, which anybody can see after the lecture; and I think when it is examined nobody will go away with the idea that the system is complicated. His criticisms as to the dealings between the Government and private firms are of course beyond my competence to comment upon. I am inclined to agree with him in advocating the 6-pr. as the best all-round quick-firing gun. When we go in for these weapons to any great extent, probably the 6-pr. will be the gun which will be found the best. His figures with regard to the execution done by the 6-pr. shrapnel and the new time-fuze of course show not merely what can be done with the quick-firing gun, but also what can be done with a good time-fuze, which I am sorry to say we do not at present possess in our Service for field purposes. Captain Verner made some very able remarks, and he is perfectly right in saying that simplicity of service is what we require, and this is what quick-firing guns excel in. Colonel Scott advocates being able to fire from the battery, as well as being able to use the position-finder, and he says that the observation from the observing room may be obscured by smoke or fog. Of course there are two observing rooms, and the observing room employed at any given time is selected on account of the smoke going away from it. At the same time it is a most important point where possible that the gun should be able to be fired from the battery as well as by the aid of the position-finder. Major Barker takes exception to my saying that our powder is bad. I apologize for this expression, inasmuch as I am fully aware of the uniform results obtained by our powder. I employed the word without due thought, the smoke nuisance only being in my mind. I most fully endorse what he says as to the importance of uniform results, and I trust he will not go away with the idea that I meant to throw any blame on our powder, except as to the smoke, which we all object to. I am sorry I conveyed a wrong impression to Colonel Richardson's mind. I did not wish to appear to abuse all existing military institutions in order to advocate quick-firing guns, neither was I aware that I had drawn any comparison between the howitzer and the quick-firing gun.¹ I took the view that the howitzer,

¹ I was unable to reply fully to Colonel Richardson owing to the lateness of the hour; a few words, however, will suffice. My remarks as to the defence of Plymouth neither expressed nor implied that it was "utterly defenceless:" it was merely taken as an instance of the kind of attack which a place of that class might expect. Referring to the position-finder, I said that the directing Officer could fire a "group" so as to hit without fail: this, I think, would be readily admitted by Colonel Richardson, but in this instance he apparently thought that I believed every individual shot would "hit without fail." In quoting from the range table of the 8-inch howitzer, I took my figures from the most recently published handbook: the results obtained at Lydd in 1888, and the extreme difficulty of observing fire correctly, would not encourage us with our present appliances to go further back than we were compelled to. Colonel Richardson says that I "talked about

at a distance of from 1,500 to 1,700 yards, was so formidable a weapon that the great object of the quick-firing guns of the defence should be to attack the working and arming parties and destroy the embryo batteries before the howitzer was able to establish its fire. Captain Salusbury made some remarks about the Gatling, but the subject does not enter into this discussion, which is as to quick-firing guns and not machine-guns. Colonel Harrington Stuart advocates quick-firing guns for Volunteers. In this I have practically expressed my concurrence. The question of ammunition supply is rather a consideration for field service than for fortress and for position services, and as such I have not dealt with it. Sir Lothian Nicholson says he does not like to discourage young Officers, and I think the kindly and seasonable remarks which he made carry with them nothing but encouragement. I am delighted to hear from so eminent an authority that there is no prejudice against quick-firing guns amongst those by whom the matter is dealt with officially. My remarks are scarcely applicable to those who, like Sir Lothian, are far above the ordinary rank and file of the profession. With reference to the 32-pr. converted gun no one can be more pleased than myself, as a gunner, to hear how good that weapon is. With reference to the inquiry of the noble Chairman as to the different natures of quick-firing guns in our own Service, the question was most *à propos*, in drawing attention to the fact that there are so very few of them *en évidence* that none of us know anything about them unless we have exceptional opportunities of studying them. I have to thank you for your kindness in listening to my paper this afternoon, and also to express my warmest thanks to the noble Chairman for the honour he has done me in consenting to preside at this meeting.

LORD WOLSELEY: Ladies and gentlemen, the hour is getting very late, and I am sure a very large proportion of my audience is very anxious to get home to afternoon tea, or if, like myself, they live in the suburbs, they are anxious to get home in time for dinner. It is not, therefore, my intention to follow the lecturer, or those who have spoken, into the very wide subject which he has placed before us in a very careful manner. I fully agree with most of what he has said. I think there is a good deal of information yet to be obtained with regard to quick-firing guns, and a great number of experiments to be carried out before we can be really in a position to know what their full and real power, strength, and advantages are. First, we do not know what the life of a quick-firing gun is. It will have enormous strains thrown upon it, and how long it will last is yet to be found out. We have, as we have just been told, a very small number of them actually in our possession, and therefore we have not perhaps become as fully *au fait* with their working and management as we hope to become in the future. As regards the Navy, I have always taken up the same position, and I am sure my gallant friend Lord Charles Beresford will bear me out in what I now say. It is this: That our country is first of all and especially a maritime country, a great naval Power, and can never expect, under the present condition of things, to be a great military Power. Supposing, therefore, it were known that we had only one million of money to spend upon the defences of this country, I would be the first man to say "by all means spend that upon the Navy." But I believe we are rich enough to have an efficient Army as well as an efficient Navy, and I cannot help feeling that the defence of our coaling stations and military ports is a very necessary adjunct to the Navy, in fact it would be absolutely impossible for our Navy to keep the sea, either in our own or foreign waters, unless the Fleet should always have already under its lee, and not more distant than about a thousand miles, some coaling station to which it can always have recourse to obtain coal, that is the means of propulsion. Without coal the Fleet of the present day can do nothing, and a sure and certain coal supply is, therefore, absolutely necessary to enable Fleets to keep the sea. It is, therefore, of

getting up to 1,200 yards:" a reference to my lecture will show that I said from 1,500 to 2,000 yards. Finally, in saying that it will not advance the cause of quick-firing guns to claim for them what they cannot do, Colonel Richardson is trying to defeat an argument which was never raised: I have, in some cases, *under-estimated* their power purposely, but never the reverse.—F. G. S.

the utmost consequence that both at home and abroad our coaling stations should be adequately defended. And then comes this question, referred to by more than one Officer during the course of this discussion, namely, "What is the most effective means of protecting these coaling stations?" and I would include our home commercial ports also, because every home port is more or less a coaling station. I cannot imagine a more expensive way of defending any coaling station or harbour than by placing in it a ship of war. It is the most expensive battery in the world. You can mount any corresponding number of guns that any ship of war would have, on land for a mere trifle compared with the cost of the ship; and I should, therefore, be the last person in the world, even on the score of expense, to recommend that the defences of these coaling stations should be guard ships, or any other description of war ships permanently stationed there. But beyond that question of cost there is this far more important point to be considered, namely, if you scatter your Fleet all over the world for the defence of your coaling stations and distribute your ships through the various ports to be defended, where will be the Fleet required to keep the sea, and to undertake those offensive operations against the coast of your enemy, which should always be the heart and soul of your great scheme for national defence, both at home and abroad? If we desire to ensure the effective defence for this country we must be able to take, by means of our Fleet, offensive action against our enemy's fleets and coasts. Unless we have a strong Navy it is impossible to do so, but you can never have a strong available Navy if you use it up in the unbusinesslike and expensive plan of scattering its ships throughout the world in the various ports to be defended. I think I might be inclined to criticize the lecture a little if time permitted of my doing so, especially on the topic of sieges to which the lecturer referred at such length, and which is of great interest to us who heard him. I do not think that in describing the sieges of the future he has at all taken into account as he ought to have done, and as any person who has to read a lecture upon sieges ought to do, the immense power of these great modern explosives. I think the explosives of the present day, those enormously powerful explosives which we know to be now at the disposal of foreign Governments, and with which, I am glad to say, we are now experimenting in this country, will completely revolutionize the whole question of fortifications throughout the world. It is, I think, a very doubtful matter if most of the defences which have been erected within the last twenty years upon the Continent of Europe are not absolutely as worthless as if they had been built upon a quicksand. They would, I think, be easily destroyed by the great explosives which are now in the possession of many foreign Powers, and which, without divulging any secrets, I may say, are also in the possession of ourselves. It is very flattering to the lecturer that he should have had such a very large audience. It shows us the very great interest taken by the public and by the Officers of the Army and Navy in the subject which he has brought before us, and I am sure I represent the wishes and feelings of every one present when I thank not only him, but also those who, like my friend Lord Charles Beresford, have given us such very valuable information upon this most interesting subject.

FIG. 1.

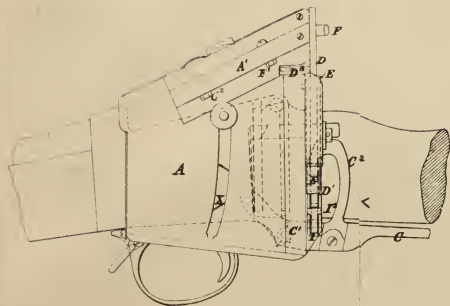


FIG. 2.

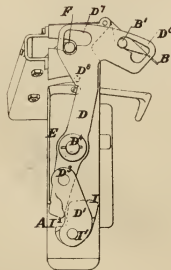


FIG. 3.

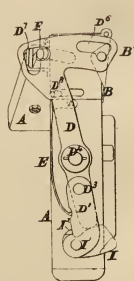


FIG. 6.

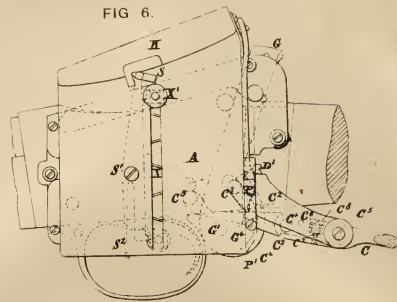


FIG. 7.

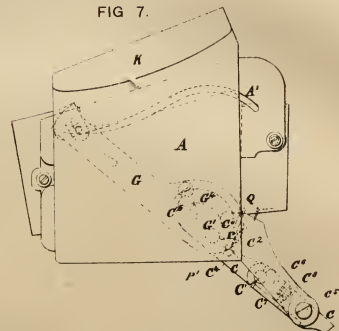


FIG. 4.

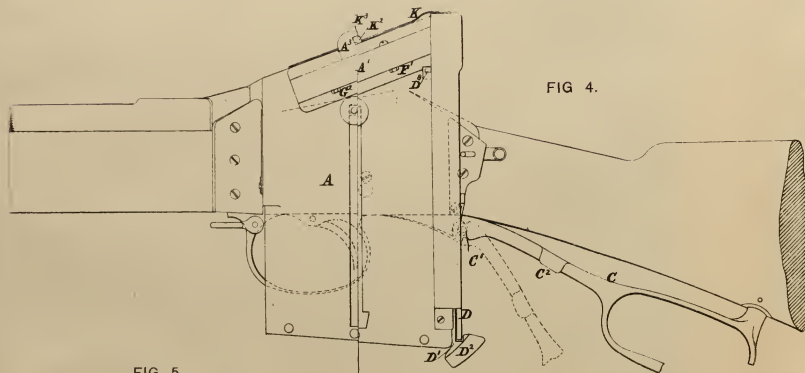


FIG. 5.

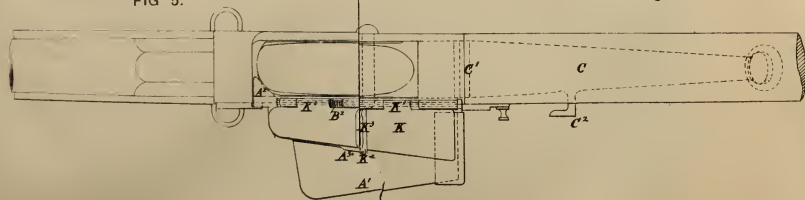


FIG. 8.

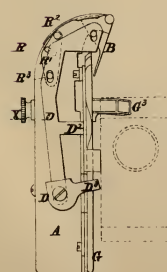


FIG. 9.

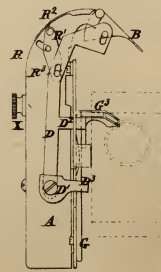


FIG 1.

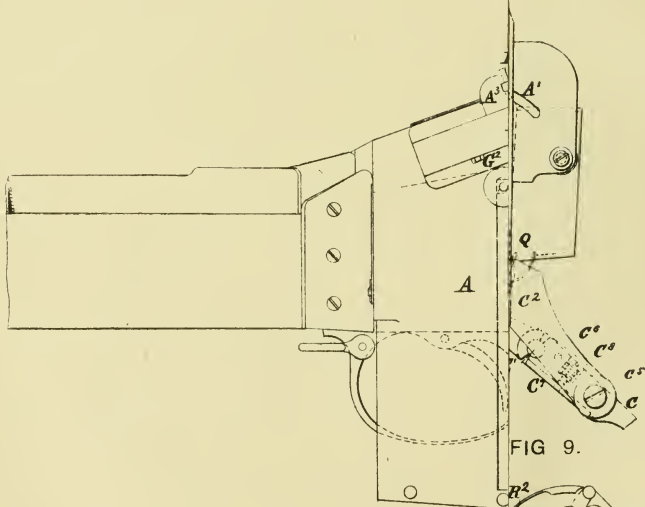
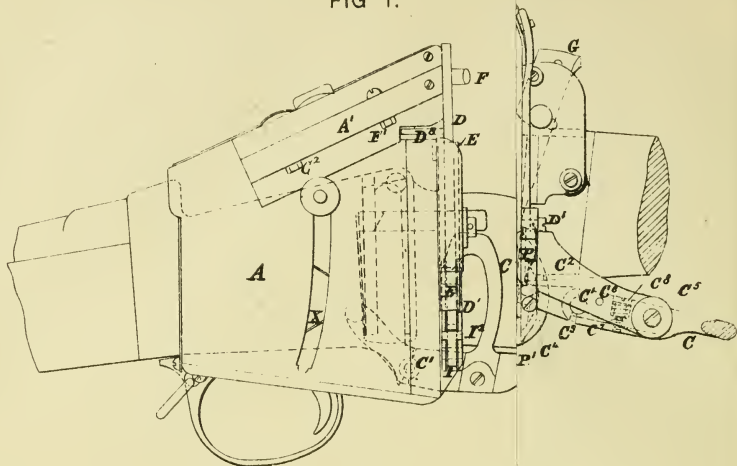
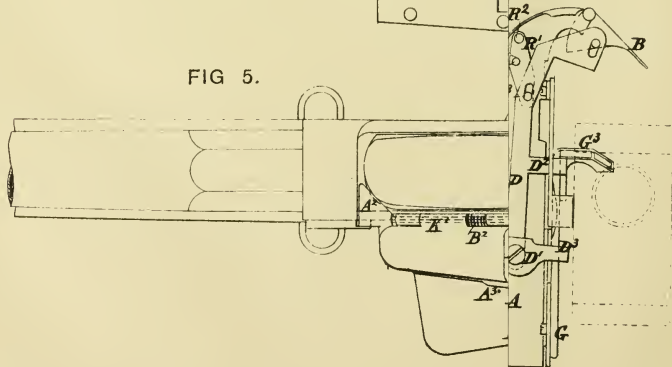


FIG 5.



DESCRIPTION OF MARTINI MAGAZINE REPEATING RIFLES.

Shown by Major GREVILLE HARSTON, of the Canadian Militia.

Friday, January 18, 1889.

SINCE I came from Canada, in August, 1887, to convert the Martini into a repeater, I have been continually pressed by your Secretary to show how it can be done, as it has been so often stated in this theatre to be impossible.

I have here three specimens, two of which have stood severe trials, but I have also several other ways of doing it, which I do not now propose to refer to.

Figs. 1, 2, and 3 represent a Mark IV magazine to hold five full-size Martini cartridges, or seven of the new small-bore 0.303.

Fig. 1 is a side elevation upon the rifle, the only alteration in which is a hinge-joint I put in the lever C at C¹, and on which I place a lug or finger C².

Fig. 2 is the magazine open, having delivered a cartridge into the chamber, and Fig. 3 is the magazine closed.

The action is as follows :—

Upon lowering the lever C the finger C² passes the "Passing Piece" I, which by aid of the spring E immediately returns to its place, the hinge at C¹ giving the lever an extra sweep. Upon raising the lever the upper end of the lever C remains stationary, whilst the lower hinged piece moves upward until the two top faces of the hinge come together. During that time the top of the finger C² presses against the lower side of the passing piece I, and forces it upwards into the position shown in Fig. 2. Upon its commencing to move upwards it forces outwards the heel of the lever D, which as it begins to move, first carries out the lid or door B by its pin B² acting in the slot D⁶, and the top cartridge is thus moved into a line with the chamber and held suspended there, the slot D⁷ having moved across now takes the carrier lever F, and the end forces the cartridge right home, whilst the door remains stationary by its pin passing along the slot D⁶. Meantime the pin D⁸ in the lever D has moved across, and is holding down the head of the next cartridge.

The top of the finger C² now goes on upwards as the breech is closed, and passes clear of the passing piece I, so that the spring E is brought into action, and immediately closes the whole magazine.

With this rifle I have fired 28 rounds whilst 11 were being fired in the best bolt-gun made, and 3 to 1 of an ordinary Martini. When the magazine is empty it can be used as a quick-loader by dropping the cartridge into the hollow of the block, the carrier lever will put

it home whilst closing the breech, and using it thus I have fired three rounds against two in an ordinary Martini. It also acts as a "blind" to the left eye, so that you can shoot with both eyes open.

Fig. 4 shows my Mark III to hold seven large cartridges, and is similar in action to the other, except that the "passing piece" D^2 moves outwards instead of upwards.

Fig. 5 shows the top view looking down on to the rifle of either of these magazines.

In these two the "carrier lever" is in a box at the top outside the magazine; but in Figs. 6, 7, 8, 9, I show one made with a carrier lever G working longitudinally between the magazine and the shoe of the action, only in this particular one, instead of using a spring and a passing piece, I have cut a slot G^4 in the carrier lever, and I make the head of the finger C^2 act upon the forward part of the slot G^4 , whilst the lever C is moving upwards on the hinge C^1 , and thus throw the carrier forward into the position shown in Fig. 7, and then as you close the breech, the continued upward movement of the finger head C^2 acts upon the rear face of the slot G^4 , and brings it back into its original position, and a portion of the finger presses the end lever at D^3 (see Fig. 9), and forces it upward into the position seen in Fig. 8, and it thus closes the magazine-door and allows the next cartridge to rise to the top.

In all the magazines I use a round top, which by its shape forces outwards the top cartridge into the action of the rifle.

I also sometimes use a lip, or guide, which is shown in Fig. 5 at A^2 , which being at an angle of 45° to the cartridge, allows the bullet to pass along it until it reaches the chamber of the rifle.

Friday, January 25, 1889.

ADMIRAL SIR AUGUSTUS PHILLIMORE, K.C.B. (some time
Admiral Superintendent of Naval Reserves), in the Chair.

THE ROYAL NAVAL RESERVE.

By W. F. CABORNE, Lieutenant, Royal Naval Reserve.

OUR conflict with Russia in 1854-56 brought into prominence the difficulty which existed in obtaining seamen for the Fleet in time of war, and showed the necessity of inaugurating and organizing a system in time of peace capable of overcoming that difficulty.

It was felt that the use of the press-gang of former years, notwithstanding the legality of the procedure, was no longer in consonance with modern views with regard to the liberty of the subject, and it had been found that voluntary enlistment in time of emergency was too precarious a plan to rely upon.

Accordingly, on June 16th, 1858, a Royal Commission on Manning the Navy was appointed, and on February 19th, 1859, its Report was signed.

Among other suggestions, the Royal Commissioners recommended that a force of Royal Naval Volunteers should be raised; such volunteers to consist of merchant seamen, and to number not less than 20,000 men.

The Commissioners said—and their words form the keynote of this paper—"Your Majesty possesses in the Merchant Service elements of naval power such as no other Government enjoys."

In the Report nothing was mentioned with regard to Officers for the new body to be enrolled.

A separate Report, and some accompanying remarks, were drawn up by the late Mr. W. S. Lindsay, M.P., a member of the Commission and a shipowner, whose name is well known as the author of "The History of Merchant Shipping and Ancient Commerce."

Mr. Lindsay contended that it would be useless enrolling a new body of men unless there were Officers to command it, and went into calculations to prove that the Active List of the Royal Navy was quite inadequate for the purpose; he, therefore, advised that Officers of the mercantile marine should be appointed as Officers of the force to be raised.

Incidentally, it may be interesting to compare the Active List of the Officers of the Royal Navy for 1859 with that for 1889, as the

comparison shows that if there was any necessity for the employment of mercantile marine Officers as a Reserve in the former year, the same necessity exists in a greater and more marked degree at the present time.

April, 1859.

Rank.	Employed.	Unemployed.	Total.
Admirals of the Fleet.....	..	1	1
Admirals (all grades).....	18	81	99
Captains	98	262	360
Commanders	173	330	503
Lieutenants	697	333	1,030
Masters.....	266	79	345
Mates	125	33	158
2nd Masters	82	7	89

January, 1889.

Rank.	Employed.	Unemployed.	Total.
Admirals of the Fleet.....	..	3	3
Admirals (all grades)	24	41	65
Captains	112	59	171
Staff-Captains	15	..	15
Commanders	156	71	227
Staff-Commanders.....	89	10	99
Lieutenants	754	105	859
Navigating Lieutenants	13	2	15
Sub-Lieutenants	77	86	163

Note.—Officers at College or on board “Vernon” or “Excellent,” for instruction, are considered as unemployed.

It is evident that in 1859 the senior Officers were greatly in excess of requirements. At the same time there was a larger list of junior Officers, but it is fair to state that the Senior Lieutenant had served in the same rank for no less a period than forty-nine years, although he was even then actively employed on board one of the contract steam vessels.

The practical outcome of the Report of the Royal Commission on Manning the Navy was the enrolment by Act of Parliament (22 and 23 Vict., cap. 40) of the Royal Naval Volunteers, now known as the Royal Naval Reserve. Evidently at first it was not the intention to give commissions to Officers of the Merchant Service, but it was found that Mercantile Jack did not present himself for enlistment with the alacrity that could have been desired; in point of fact he appeared to

be under the impression that it was only a plan to entrap him into the Navy, and might turn out to be another form of impressment.

In order, therefore, to disabuse the minds of the seamen and to encourage the movement an Act (24 and 25 Vict., cap. 129) was passed, authorizing Her Majesty to avail Herself of the services of certain Officers of the mercantile marine as a reserve to Her Navy.

I may here mention that times have changed, and that the Officers are now considered to be an important branch of the force. The first commissions were granted in 1862, and from that time the Royal Naval Reserve made headway as regards numbers, but for some years it languished in the cold shade of official neglect. The regulations for Officers have been altered and amended from time to time.

The following table will show the state of the Officers' list at present, viz., January, 1889 :—

Rank.	No. authorized.	No. enrolled.
Lieutenants	150	51
Sub-Lieutenants	270	117
Midshipmen	200	137
Engineers	150	14
Assistant Engineers.....	150	4

In accordance with the regulations of 1886, 2 Lieutenants, 5 Sub-Lieutenants, and 2 Midshipmen have undergone twelve months' training in the Royal Navy, and 4 Lieutenants, 2 Sub-Lieutenants, and 4 Midshipmen are now serving.

In addition, several Lieutenants and Sub-Lieutenants have gone through short courses in torpedo and gunnery on board the "Vernon" and the "Excellent," and a few Officers have also been appointed to Her Majesty's ships for the summer cruizes.

The paucity of Engineers in the Naval Reserve is noteworthy.

It would be an excellent thing—and probably would attract more men to the Service—if the Engineer Officers were allowed to undergo a period of naval training upon conditions similar to those laid down for the Executive branch.

The seamen, who must be British subjects, are divided into four classes, made up as follows :—

First Class.—Able seamen or men of higher rating, and skippers and second hands of first class fishing vessels.

Second Class.—Ordinary seamen or fishermen.

Third Class.—Boys.

Fourth Class.—Firemen.

The Act of Parliament sanctions 30,000 men, but at present we have—

9,435	First Class.
8,969	Second Class.
312	Third Class.
439	Fourth Class.

Total 19,155

The annual retainers given to the men, in a year to pay and allowances while attending drill, are for the first class, 6*l.*; for the second class, 2*l.* 10*s.*; and for the fourth class, 5*l.*

The men belonging to the first class are also entitled to a pension of 12*l.* per annum, on certain conditions, upon attaining the age of sixty.

The first, second, and third classes are required to drill for 28 days in each year, but the fourth, or stoker class, is exempted from Naval training. The exemption referred to is, I think, a grave mistake.

In the Naval Estimates for the current year, the sum of 229,806*l.* is appropriated for the expenses of the Royal Naval Reserve; this amount includes, however, the pay and allowances of the Admiral Superintendent and his office staff, the pay, victualling expenses, and allowances of the Officers and men of the Royal Navy employed in the drill ships, &c., and other items.

It is difficult, I may say impossible, to ascertain the exact strength of our sea-faring population, owing to the fact that numbers of sailors are employed on board yachts, in docks, &c., who, in consequence, are never brought under the notice of the officials.

According to the Board of Trade Returns for 1887, there were employed during that year in the Home and Foreign Trade of the United Kingdom, the Isle of Man, and the Channel Islands, 17,723 British vessels, equalling 7,123,754 tons, manned by 184,958 persons (exclusive of Masters and Asiatics), of whom 24,046, or 15 per cent., were foreigners.

I may point out that in 1851 the foreign element was only 4·2 per cent.

In 1887 the approximate number of fishermen, including those only engaged in that calling periodically, appears to have been 125,498.

Thus our mercantile sea-faring population, including Masters (say 17,723) and foreigners, aggregate 328,179 persons, and allowing these figures to be practically correct at the present time, our Naval Reserve (19,478 Officers and men) only equals 6·3 per cent.

The presence of such a large number of foreigners in our mercantile marine is a standing danger to the country, and one very difficult if not wholly impossible to deal with in these days of competition and free trade.

I am not very sanguine as to the success of such a plan, for I am aware that the patriotism of many men does not extend beyond what they at the moment consider to be the best interests of their individual pockets, but I think that an earnest effort should be made to bring to the notice of British ship-owners the national evils and dangers

attendant upon the present system of largely employing foreigners, and to urge upon them the importance of instructing the masters of their ships to engage Englishmen, when procurable, in preference to aliens.

In this paper it is impossible to discuss the various causes which have led to this influx of foreigners, reducing as it does, in addition to other evils, the employment available for our own countrymen, but I am afraid that the British seaman has, in a great measure, himself to thank for this truly deplorable state of affairs, and there can be no doubt but that the tender-hearted, well-meaning, and misguided persons who have, at various periods, posed as Jack's best friends have been, in reality, his worst enemies.

I would submit that it is a disgrace to the country, and a national scandal, that so little has been done to utilize our vast mercantile marine as a means of defence in time of war; and when one takes into consideration the large reserves maintained by some of the European Powers, one is struck dumb at the fatuity displayed by successive British Administrations. Our sea-faring population is second in quality to that of no other country in the world, and is superior numerically; accordingly, it is difficult to understand why it is not taken more into account in the scheme of national defence.

The supineness exhibited is, doubtless, one of the penalties that a country has to pay for the blessing of Parliamentary government, and for the pleasure of being ruled by party vote.

I claim for the Naval Reserve that it has, among other advantages, the merit of being a comparatively cheap organization, and it should be remembered that the larger it becomes, the more the individual cost per man will be lessened.

The second class should be reinforced by at least 10,000 more men, and I understand that there would be little difficulty experienced in obtaining that number. The extra annual cost entailed would be less than 80,000*l*.

Although the first class should also be brought up to a greater strength than at present, if possible, I have chiefly advocated the increase in the second class for financial reasons, and also because a portion of the difference which existed between the two classes in 1859 has been swept away by the diminution of the number of masted ships in the Royal Navy.

No matter what any one may say from a feeling of sentiment, and that sentiment may be respected to a certain degree, sail is doomed as far as the Navy is concerned, and rightly doomed, for it cannot for a moment be considered as a factor of any real importance in modern warfare.

Prior to the formation of the Royal Naval Reserve, the country in a measure depended upon the services of the Royal Naval Coast Volunteers, of whom Mr. Lindsay, writing in 1876, remarked, "The Royal Naval Reserve has materially superseded the old Reserve known as the Naval Coast Volunteers, which, it was found, included men in every trade and profession under the sun, except that for which they were intended, and many of whom were of no trade or

profession whatever, having no place of regular abode except the county gaol or local prison, where they were found when their period for drill musters arrived."

The Royal Commissioners expressed an opinion not altogether favourable to the Naval Coast Volunteers, but at the same time recommended that they should be increased to 10,000 men.

The Commissioners, when making this recommendation, had a presentiment that the Second Class Reserve would attract the best men from their ranks; this presentiment was completely fulfilled, and the force gradually died out.

The Naval Estimates for 1859 provided for 40,000 Officers, seamen, and boys in the Fleet; 7,400 Officers and men in the Coastguard, and 15,000 Officers and men in the Royal Marines; in addition, there were about 6,900 Naval Coast Volunteers; making a grand total of about 69,300 Officers and men.

Briefly, the Royal Commission advocated that the Coastguard should be increased to 12,000 men; that a Pensioners' Reserve of seamen and marines, numbering 3,000 and 5,000 men respectively, should be established; that a Naval Reserve of 25,000 men should be raised from the mercantile marine; and that the Royal Naval Coast Volunteers should be brought up to a strength of 10,000 men. When all these recommendations had been carried into effect, the total number of Officers and men available for naval operations would have been 104,000.

In 1887, twenty-eight years after the Royal Commission concluded its labours, the average number of persons enrolled amounted to 45,976 Officers and men in the Fleet, 3,893 Officers and men in the Coastguard, 12,697 Officers and men in the Royal Marines, 2,266 men in the Seamen Pensioners' Reserve, 18,361 Officers and men in the Royal Naval Reserve, and 1,050 Officers and men in the Royal Naval Artillery Volunteers; making a grand total of 84,243 Officers and men.

Thus we find that in 1887, excluding the ordinary naval pensioners who are liable for service until they attain the age of fifty-five, and whose number I have not been able to ascertain, we were nearly 20,000 men short of the strength which had been considered necessary for our national safety in 1859.

I am aware that some authorities do not consider that our deficiency lies in men. It would, however, be interesting to learn to what extent those gentlemen have taken into consideration the wastage likely to occur shortly after the commencement of hostilities.

Times have changed, and it is quite true that modern ships do not carry such large crews as did the vessels of the past: on the other hand, we have a much larger mercantile marine to protect, and some of our outlying possessions and distant Colonies have attained an importance and an amount of prosperity which thirty years ago would have been considered almost fabulous.

Are our various naval forces, as regards the personnel alone, equal to the great task of efficiently guarding the Empire in time of war? The insufficiency of the matériel appears to be generally admitted.

My opinion may be of little value, but I cannot help thinking that we are living in a fool's paradise, and that some day we may have cause to bitterly repent our supineness in not doing our utmost to perfect as far as possible our maritime defences.

In succession to the happily defunct Naval Coast Volunteers, we have a small body of Royal Naval Artillery Volunteers (now numbering about 2,003 Officers and men) which might be augmented, but such augmentation should not be brought about with the intention of in any way restricting the expansion of the Royal Naval Reserve, for it stands to reason that no Volunteer force consisting of landsmen of various professions should or can be allowed to supersede in the slightest degree men trained to a sea-faring life and inured to dangers and hardships from their youth up.

The two bodies have their separate spheres of action and usefulness, and are and must remain totally and wholly distinct.

A seaman is not made in a day, but is the product of years of experience and hard work at sea.

There is a tendency in the present day to underrate modern seamanship, and to assume that when steam is the propelling power, anyone can handle a vessel efficiently.

Those who have had any experience are aware that that is not the case.

The seamanship of the days of Nelson may have passed away, but the manœuvring of the present era requires no less care, experience, judgment, nerve, and skill; and in an engagement in the future, as in the past, the most experienced and capable commander will possess an incalculable advantage.

Not only should the Second Class Naval Reserve be largely added to, but some of the more intelligent among the men should be carefully instructed in submarine mining and torpedo work generally, for the defence of our harbours and for this employment their local knowledge as fishermen should prove invaluable.

The necessity of drilling the Naval Reserve at machine, quick-firing, and the lighter nature of breech-loading guns cannot be too strongly urged, for it appears to be an absurdity and an absolute waste of money to spend large sums in training men in the use of weapons which are practically obsolete, and will not often, in the immediate future, be met with afloat. If it be thought worth while to have a Naval Reserve at all, it seems to me that it is advisable to try and bring it up to a modern standard of efficiency. Exception may be taken to the system of Naval Reserve men drilling in Coast-guard batteries, but one is aware that in many cases it is unavoidable.

The principal objection is that the surroundings of a battery cannot, in the ordinary nature of things, be so conducive to good discipline as are the surroundings of a ship, and discipline is an important, if not the most important, factor in the training of a fighting force, for you may drill the men well, they may be good marksmen and generally understand their duties, but, after all, without discipline they will not rise above the level of an armed mob.

It has been proposed that the men, instead of being instructed on

board the drill ships and in the batteries ashore, should be sent afloat in the Navy for some fixed period, but my impression is that the plan would not work well and would be unpopular, and this latter point must not be overlooked, as popularity is as the breath of life to a voluntary organization.

Personally, I should like to see some of our warships usually laid up in the Steam Reserve, or at any rate some of our worn out ironclads sent to the principal ports and used as drill ships; the present old hulks being abolished.

A considerable saving as regards expense would probably be effected in this way, and the men would have the great advantage of becoming acquainted with a more modern type of fighting vessel.

At the two great centres, London and Liverpool, where the Officers principally attend for instruction, the question of appointing Gunnery Lieutenants to the drill ships (in addition to the Commanders) to superintend the drills, is worthy of consideration for many reasons; if this were done, the value of the results obtained would vastly outweigh the slight additional expense incurred.

Another important and valuable innovation would be the appointment of Gunnery Lieutenants to each District, whose duty it would be to inspect, at uncertain intervals, the drill ships and batteries.

While upon the subject of instruction, I would point out that the men who drill in London suffer under the very great disadvantage of not being able to carry out heavy gun practice as there is no range available, the one at Plumstead having been closed to artillery fire.

It is true that the "President" has a 9-pounder field gun fitted with a Morris' tube, which is found very useful in teaching the men to aim correctly, but it is also necessary that they should be taught to stand fire.

In order to overcome this deficiency, I would suggest that at places where there is only a rifle range a 32-pounder, or some similar gun, should be fitted with a rifle placed in such a manner that when the rifle was fired at the target, at the same moment a blank cartridge would be discharged from the gun.

It would be a great advantage if a gunboat were attached as a tender to the "President," at any rate during the summer months, so that the men might be taken occasionally to the mouth of the river for target practice; in this way they would be taught to aim and fire under some of the conditions of naval warfare.

It is a matter for deep regret that the authorities at the Admiralty did not embrace the opportunity of calling for volunteers from among the seamen of the Naval Reserve for service in the Fleet during the late manœuvres.

In 1869 it was determined to get as many Naval Reserve men as possible to volunteer for a short cruise, and the result was that 12 Officers and 1,700 men embarked on board the different ships of the Reserve Squadron, under the command of the late Admiral Sir Astley Cooper Key.

At the end of the cruise the Commander-in-Chief submitted a

long Report to the Admiralty, in which the following passages occur:—

“It must be evident from the foregoing remarks that I consider the Royal Naval Reserve as a valuable means for manning the Fleet on an emergency or during war; it includes in its ranks a large proportion of the best seamen of the mercantile navy; and I do not believe these men would be inclined to desert their colours, or break their engagements, should the country require their services.

“The Officers of the Reserve who volunteered their services during the late cruize are so well known in the mercantile navy that it is needless to mention their great practical experience as seamen and navigators. They rendered every assistance in their power to the Officers in command, and showed an anxious desire for the well-being and good behaviour of the seamen of the Reserve during the time they were embarked.”

In an Admiralty Minute on Admiral Key's Report, “My Lords” said that they considered “the Royal Naval Reserve a most valuable body.”

Sir Astley Cooper Key was of opinion that when Naval Reserve men are embarked on board men-of-war they should not be looked upon as a separate class, but should be mixed up with the ordinary crew as much as possible, and there cannot, I imagine, be two views with regard to the wisdom of this course.

With respect to the armed merchant cruizers, they should in time of war be entirely manned, officered, and commanded by the Royal Naval Reserve, and if this plan were adopted there can be little doubt but that the best possible results would be obtained; in point of fact, I am in favour of employing the men of the Reserve when practicable as much as possible under their own Officers.

In support of this opinion I would point out that both Officers and men are intimately acquainted with the particular class of vessels to be employed, and, moreover, are accustomed to serving with one another, a consideration of no small value and importance.

Of course, with this end in view, the first thing to be done is to render the Officers thoroughly proficient in gunnery and various other naval acquirements. As we have seen, some of them have already qualified, and if inducement be held out, in all probability many more will follow their lead.

Sir Astley Cooper Key recommended that the Reserve should be brought into closer relationship with the Admiralty; but nothing appears to have been done in that direction, for at the present time communications to and from the Admiralty are made through the Registrar-General of Shipping and Seamen, and the Board of Trade. The absurdity of this arrangement has probably never been fully realized or appreciated (except by the sufferers), but the natural and inevitable result has been an immense amount of circumlocution, loss of time, and consequent dissatisfaction, and it is very easy to imagine the scope there has been, and is, for a display of the ever memorable tactics of Messrs. Spenslow and Jorkins.

I am bound to admit, however, that for the first few years of the

Reserve's existence, the system, for some reasons, was the best that could be devised; now it must be condemned as unsatisfactory and expensive.

The fact of the matter is we are out of touch with our head—the Admiralty—and I ask whether this is not detrimental to the best interests of the Reserve?

I urge the importance of bringing the Royal Naval Reserve into close touch and communication with the Admiralty, and if this were done, matters would be much simplified, and the belief would be induced that we are somebody's children, and not one of the lost tribes.

If the Naval Reserve is intended to be a fighting force, it should be allied as closely as possible to the Navy through their common head, the Admiralty; if, on the other hand, it is not intended to be a fighting force, it should be abolished at once.

I say, and I say it advisedly, that the more the Naval Reserve is brought into direct contact with the Admiralty the more efficient it will become.

In making the foregoing remarks I wish it to be distinctly understood that I am attacking the established system only, and not individuals, and it is only right that I should publicly acknowledge the courtesy I have always received at the hands of the officials connected with the different Departments.

An objection frequently advanced against the Naval Reserve—and one which was recently brought forward by an American critic—is that in time of emergency great difficulty would be experienced in getting the men together, owing to a number of them being employed at their ordinary avocations in all parts of the world.

Now this stricture, if it be a legitimate stricture, only applies to less than one-fourth of the number of men enrolled; the remainder being employed in the home-coasting trade, the fisheries, and other occupations in the United Kingdom.

Now, it seems to me that the fact of some of the men being scattered all over the globe is a very great advantage indeed; instead of being a weak point, as is generally asserted, it is a strong point.

I am willing to admit that there would be something in the contention of the critics if our interests were confined to the British Isles, but we happen to be in the position that our interests and our possessions lie all over the world, and our war-ships are to be met with on every sea.

Upon the outbreak of war what would happen?

Our Naval Commanders would look around them and ascertain the number of Reserve men to be picked up in their vicinity, and they would immediately take those men to reinforce their crews and to fill up possible casualties, thus effecting a saving of time and expense, as, otherwise, men would probably have to be sent out from England for the purpose. For instance, during the so-called Russian scare, the Shipping Master at Bombay sent constant Returns to the Admiral (the late Sir W. N. W. Hewett, V.C., K.C.B.) of the number of Reserve men in the harbour. At that time the crew of the "Philomel"

had been transferred from that little vessel to one of the harbour defence turret ships, and an addition of, say, fifty men to her complement would have been more than acceptable.

The principal difficulty will probably occur in getting together and disposing of the men who are actually in England, in consequence of there not being, as far as I can learn, any comprehensive and effective mobilization scheme in existence.

There is an old saying that "too many cooks spoil the broth," and we may ask ourselves whether, in the event of sudden danger, the circuitous system I have already commented upon is calculated to lead to rapid and orderly mobilization, or to chaos?

Personally, I am inclined to take the latter view.

Of course, if we have timely warning of the coming storm no particular harm may ensue, but it is quite within the bounds of possibility that in future a declaration of war may come upon us like a thunderbolt shot from a clear blue sky. And then where shall we be?

Any paper dealing with the Royal Naval Reserve, however short and incomplete, should contain at least a few passing remarks respecting the merchant steamers subsidized by the Admiralty for employment as armed cruisers.

Personally I do not share the views of those who express unqualified approval of the arrangements entered into with some of the Mail Companies, whereby certain steamers are reserved for the use of the Government in time of war, for, in the first instance, as was pointed out on a previous occasion in this Institution by Lieutenant Crutchley, R.N.R.,¹ the vessels in question are too long, large, and generally unwieldy for the services required of them. It is true that a few of those ships might be usefully employed as fast colliers in attendance on the fleet, but even then their particular value would, to a great extent, depend upon an efficient plan being devised for coaling ships at sea.

I shall endeavour to show that by withdrawing many of our mail steamers from the mercantile marine in time of danger the country will be weakened rather than strengthened.

It is well known to all here, although it is a fact which appears to be little understood or appreciated by the general public, that in the event of war the question of the food supply of the country will be of the greatest importance, and that if any reverse be experienced by the Fleet it will be a subject the gravity of which cannot possibly be overrated.

It is a fact that cannot be too strongly impressed upon the general public—and it is one that few persons will endeavour to controvert—that although our coasts may be well defended, and invasion rendered impossible, yet, should disaster overtake the Fleet, and our merchant ships be unable in consequence to keep the seas, this proud and wealthy country would have to yield to its enemies owing to the presence within of a mighty and irresistible foe named Hunger.

¹ See Journal, vol. xxx, No. 134.

The quantity of food ordinarily in the country has been variously estimated as equal to the requirements of the people for a period of from three weeks to three months, and our annual imports are something enormous.

So vital is the matter of the provision supply that I have thought it well, instead of naming a lump sum, to draw up a condensed table showing the value of our sea-borne food-trade for the year 1887, the figures having been taken from the "Annual Statement of the Trade of the United Kingdom."

1887.

Description.	Imports, value.	Exports, value.
	£	£
Oxen, bulls, cows, calves, sheep, lambs, and swine	6,149,048	..
Meat of all sorts, including bacon and hams.	14,344,295	831,138
Butter, butterine, cheese, and lard.....	18,009,326	815,020
Wheat, flour, and other corn, grain, and meal	48,290,793	734,650
Tea, coffee, and cocoa.....	14,941,171	4,635,365
Eggs	3,085,681	..
Fish	2,032,423	2,027,695
Fruit, almonds, and nuts for fruit	6,770,113	570,704
Hops.....	427,753	32,096
Confectionery	718,202	215,592
Onions, potatoes, and other vegetables.....	2,191,947	..
Poultry, game, and rabbits.....	722,235	..
Rice.....	1,873,551	1,080,769
Sago, and other farinaceous substances	1,061,312	127,762
Spices	1,616,186	1,020,019
Sugar	16,861,974	1,053,408
Yeast, dried	774,028	..
Provisions, unenumerated.....	..	707,602
Isinglass and liquorice	181,779	..
Biscuit and bread .....	..	550,297
Wine and spirits.....	7,700,176	1,997,854
Tobacco, cigars, and snuff	3,399,521	426,839
Ale and beer .....	..	1,678,360
	£151,151,514	£18,505,170

Thus it will be seen that during the year under review the value of the food imports exceeded the exports by the sum of 132,646,344*l*.

The reports already published are close approximations only, but from them we find that in 1888 the imports of articles similar to those already enumerated amounted to about 159,788,520*l*., and the exports to about 21,772,429*l*.; the imports exceeding the exports by about 138,016,091*l*. In 1859, the corresponding figures were 57,074,651*l*., 10,387,051*l*., and 46,687,600*l*.

Now, should we be engaged in fighting against a powerful maritime State, it is pretty certain that none of our sailing ships would put to sea, and it is also very questionable whether any of the weak-powered steamers would venture to do so (unless England, by the possession of a very powerful Navy, was the assured mistress of the seas), owing to the heavy war risk that would be imposed. Of course, there is the old system of convoys, which, in some cases, might be resorted to for a few of the slow boats, but it is very doubtful whether it will be extensively employed in the future. It will be within your recollection that Admiral Colomb delivered a very interesting lecture in 1887, in this Institution, upon the subject of "Convoys, are they any longer possible?"¹ The large mail steamers, then, would be required to carry our food supply, and those vessels, on account of their great speed, would be practically safe from capture, would not require guns for defence, and would, I imagine, have to pay a comparatively small war risk.

Possibly I shall be told that the "Sandfly" succeeded in capturing a number of our largest and finest steamers during last summer's manœuvres. Doubtless she did, but it was during a period of profound peace, when Captains of merchant ships were not likely to burn extra coal or use special endeavours to get out of the way; in point of fact, they did not trouble their heads about the matter, and, as far as this part of the evolutions is concerned, we have learned very little. Would the "Sandfly," had she been a real enemy, have captured the same ships in war-time? It is very doubtful for many reasons.

What I particularly wish to urge is that by taking up the mail steamers for armed cruisers the indispensable food transport of the country is directly reduced.

It must be borne in mind that great speed is an absolute necessity where mail steamers are concerned; without great speed they cannot carry on their ordinary business. Now, most of the owners of the other steamships do not require a rate of more than ten or eleven knots, at the outside, for their respective trades, and it would be a loss to them if they were to put higher power into their boats, as they would be locking up an amount of capital which, under ordinary circumstances, would be non-productive.

The late evolutions have shown the necessity of having a large number of fast cruisers, and if the country is to depend, in a measure, on armed merchant ships during war, I would submit that instead of paying large sums for mail steamers, which, as a rule, are unfitted for the work, it would be far better to offer terms to some of the ship-owners at present owning comparatively slow boats to induce them to build fast and suitable ones—say, 18 or 19-knot twin screw vessels of about 3,000 tons gross register.

By adopting this scheme the country would be materially strengthened, at, I venture to think, a not unreasonable expense.

In all cases, the steamers selected for cruisers, whether under the present or proposed system, should be commanded by Officers of the

¹ See Journal, vol. xxxi, No. 139.

Royal Naval Reserve, and a certain number of the Officers and men should belong to the same service.

Lieutenant Crutchley has drawn attention to the fact that there are no petty officers in the Naval Reserve, and I thoroughly agree with him that it would be much to the advantage of the Service, and would greatly increase its popularity, if it were known that good conduct, attention, and ability would bring to the best and steadiest of the men an opportunity of obtaining a little well-earned promotion.

Fair prospects with regard to pay and advancement are great incentives to energy and zeal in every class and position in life.

Having recently had the honour of serving for upwards of twelve months in the Fleet, I am aware that this is a difficult question to handle for many reasons, the least important being the item of expense, which would be insignificant, and one of the more important being that such petty officers would only be available for service in merchant cruisers, for, however good men they might be, they would not have that knowledge of the minute routine and customs of a man-of-war which would be a *sine quâ non* for men in their position, and without which a considerable amount of friction might occur with the higher powers.

It is true that it might be made a condition of promotion that the men selected should serve, say, six months, in a man-of-war before being confirmed in their ratings.

It is also probable that, from a mercantile marine point of view, it would be advisable to select the petty officers from among those who hold similar ratings in the merchant service. "Where there is a will there is a way," and for vessels manned by Naval Reserve crews, Naval Reserve petty officers would be invaluable and indispensable.

Merchant shipping is seldom mentioned in this Institution without the Declaration of Paris being alluded to, and the question has several times been discussed as to whether it would be lawful for a merchant ship to resist capture.

The days of cheap guns have passed away, and, owing to the great cost of modern weapons, no merchant vessels will, in all probability, be armed by their owners; consequently, the matter as regards the ordinary merchantman will not be likely to crop up practically.

Here it may not be altogether unprofitable to consider for a moment what is meant when we speak about the sea-borne commerce of this country.

In 1859 the gross value of the imports and exports amounted to 334,875,330*l*.

Passing onward, I find from the "Annual Statement of the Trade of the United Kingdom," that in 1887, 676,429 vessels, equalling 149,642,960 tons, entered and cleared at our various home ports, and of this number 50,647 vessels, equalling 19,062,590 tons, belonged to foreigners. The total value of our imports and exports during the same year amounted to 642,990,725*l*., of which 165,834,322*l*. represented the direct trade with our Colonies and possessions.

As I have already explained, the Trade Returns, as yet issued, for 1888, cannot be considered as strictly accurate, although they are approximately so, but from them we learn that last year our imports

and exports are estimated to have increased to the goodly sum of 684,329,410*l*.

The preceding figures are, in themselves, stupendous, and yet we must remember that they do not include our inter-colonial trade, or our colonial trade with other countries.

When to all of the above we add the value of our mercantile marine (said to be worth about 93,000,000*l*.) and the value of our sea-ports and towns on the coast of the British Empire, we may well ask ourselves whether 13,776,572*l*. (the current Naval Estimates) is a sufficiently large insurance premium to pay upon the vast sums at stake, and, in fact, upon our national existence?

Assuming that the Naval Estimates for 1859 (9,613,181*l*.) represented an adequate expenditure upon the Fleet for that year, and basing our calculations entirely upon the value of the imports and exports, and their subsequent increase, our expenditure upon the Navy during the financial year 1888-89 should have amounted in round figures to 20,000,000*l*.

Unless England is in a position to prove herself mistress of the seas, by the possession of a powerful Navy such as is advocated by Lord Charles Beresford—a Navy capable of meeting upon equal terms the combined fleets of any two of the Great Powers of Europe—a Navy capable of making the enemy's coast line the frontier of her defences—how much of her stupendous wealth, and how many of the sources of that wealth, will remain to her at the conclusion of any great war in which she may be engaged?

There are people who exclaim, "Oh, it will be all right in war-time! We shall transfer our ships to a foreign flag, and then our commerce will be carried on as usual under neutral colours." I ask, will the trade and will the vessels so transferred ever again return to the British flag? Has the trade which was, under similar circumstances, transferred from the American flag ever returned to it? And has not history a playful little knack of repeating itself? I leave these questions to be answered by more competent authorities than myself.

Assuming that the neutral flag covers the cargo, with the exception of contraband of war, a pertinent question forces itself to the front. What is contraband of war? The general reply would probably be arms, ammunition, and the ordinary munitions of war. But we must remember that France, in recent years, when coercing China, claimed that rice came within that category, and presuming that the former country, either alone or in conjunction with some other Power or Powers, was engaged in a struggle with ourselves, what is there to prevent all descriptions of food being declared liable to capture?

Again, there are some men who maintain that no civilized enemy will bombard or otherwise molest our undefended sea-ports and coast towns. It may be consolatory to many to hear this opinion, but I cannot say that I attach much weight to it. Probably no enemy will bombard a defenceless place if it be possible to obtain a heavy ransom without doing so; the ransom not being forthcoming on demand, it is very possible that there will be some future employment provided for the bricklayers.

I do not profess to know much about international law, but this I do know, that *law of any sort is effective only when it can be duly enforced*. Abolish the police in England and see how long the law will be obeyed !

No doubt so-called international law will be respected, the statements of sickly sentimentalists to the contrary notwithstanding, just as long as its clauses are in agreement with the wishes and interests of the nation which happens to prove itself strong and powerful in the day of battle ; let it in any way clash with those wishes and interests, and it will be swept away into the limbo of the past.

One of my principal objects in coming before you to-day is to advocate, as far as in me lies, a steady and progressive policy with regard to the auxiliary portion of our first line of defence.

Unfortunately, we in England are too much given to putting off preparation for war until such time as imminent danger stares us in the face, and then our efforts are of the spasmodic, unsatisfactory, and highly expensive order.

It behoves us to prepare for the war—to which the wars of the early part of the century will be but as child's play—which it does not need the foresight of a prophet to foretell will inevitably take place before many years have passed over our heads.

The visionaries who profess to look forward to the time when there will be universal peace and brotherhood among the nations, and to the day when all international disputes will be settled by arbitration, must feel much discouraged, one would imagine, when they read that the Continental Armies of Europe, including all Reserves, aggregate about 28,000,000 of men.

Let us pray—let us hope—that the arbitration theorists may never see their wishes fulfilled, as, should they do so, our great Empire would be called upon to play the part of a plump pigeon handed over to the tender mercies of a commission composed of hungry and greedy hawks.

Europe is in arms ! Do our countrymen sufficiently grasp the meaning of those words, and are they aware of the envy and avarice which our vast commerce and stupendous national wealth not unnaturally excite in various parts of the world ?

To return to our subject. There are some persons who appear to take a particular and peculiar delight in running down the Royal Naval Reserve.

We may be, and are, primarily merchant seamen, and we are not ashamed of the fact ; but have merchant seamen never played an important part in war ?

I think that the annals of the past will show that merchant ships manned by merchant sailors have given a very good account of themselves upon more than one occasion.

Do those who affect to sneer forget that in all the great sea-fights of the days gone by, the ships of the Royal Navy were largely manned by merchant seamen, men who had enlisted or been forcibly seized by the press-gangs ?

The Royal Naval Reserve is not perfect. Far from it ; but its

imperfections are not so great as are sometimes laid to its charge and are due less to the personnel than to the system.

Of the men, taken as a body, the country has no reason to be ashamed, and as far as intelligence is concerned they are not inferior to their brethren of the Royal Navy.

The fact of the matter is, that although a considerable amount of money has been spent during the last thirty years, but little real encouragement has been offered to Officers or men, and, moreover, they have been hampered by the peculiar control upon which I have already animadverted.

In the way of encouragement much might be done without the country incurring any expense whatever. For instance, if the Admiralty were to notify that when taking up transports preference would be given to vessels commanded by Naval Reserve Officers and partially manned by Naval Reserve men, provided they were in other respects suitable for the employment, ship-owners who now eye it askance would suddenly discover hidden virtues in the force. It is wonderful the way in which the pocket sometimes affects the understanding.

Then, again, the questions of promotions, retirement, and the privilege of wearing the blue ensign, require to be dealt with in a more modern and generous spirit.

In writing this paper, I have endeavoured to steer clear of grievances, notwithstanding their existence, and it would be unbecoming on my part to unduly criticize the regulations in this Institution, but I feel that I should fail in a plain duty did I not express my personal and sincere regret that those in authority have seen fit to abolish the Extra Master's Certificate of Competency as one of the qualifications requisite for obtaining a Lieutenant's commission, for I cannot look upon it as anything but a retrograde movement, a levelling down instead of levelling up.

I am bound to state, however, that some Officers disagree with me upon this point; nevertheless one or two of the dissentients to whom I have spoken think that there should be some qualifications required over and above the ordinary master's certificate.

When alterations in the regulations are in contemplation, it would be an advantage if some of the Officers were asked for an expression of opinion with regard to the proposed changes, and I venture to think that such a proceeding would in no way tend to weaken the supreme authority of the Admiralty.

I will go farther still, and say that it would be highly beneficial if it were found feasible to attach a Royal Naval Reserve Officer to the Admiralty.

Sir Astley Cooper Key, as we have already seen, when reporting upon the Naval Reserve, said that he did "not believe these men would be inclined to desert their colours, or break their engagements, should the country require their services," and I beg most emphatically, and in all sincerity, to be permitted to endorse that opinion.

In the present Royal Naval Reserve we have the germ, the nucleus I may say, of a valuable defensive and offensive force, and although

I have only advocated an immediate addition of 10,000 men, yet we ought not to rest until every sea-faring man in the kingdom capable of bearing arms has been efficiently trained in their use.

I may be accused of having wandered from my subject more than once, and I am aware—painfully aware—that I have put my views before you in a very feeble and clumsy manner, yet I venture to think that every point I have touched upon is indissolubly linked to and bound up with the question of a strong and efficient Navy and a strong and efficient Naval Reserve.

At last, thanks principally to the exertions and earnest warnings of several distinguished Naval Officers well known to this audience, the country appears to be awakening from the torpor and lethargy into which it has been plunged for so many years, and is beginning to see the urgent necessity of a larger expenditure upon the Fleet; accordingly there is now a prospect that in the immediate future the matériel of the Royal Navy will be considerably augmented.

Unless the personnel of the Royal Navy be also largely added to in time of peace, the country will in time of war be greatly and in an increased degree dependent upon the services of the sailors of the mercantile marine as represented by the Royal Naval Reserve.

Such being the case, it is imperative that no exertion should be spared, and no stone left unturned, that will in any way tend to the future welfare and increased efficiency of that body.

Before concluding, I should like to say that this paper was in all its main points written some months ago, but that I have recently made a few alterations and brought necessary figures as closely up to date as possible.

Thirty years have elapsed since the Royal Commission on Manning the Navy presented its Report, and numerous, wonderful, and great have been the changes that have taken place in the maritime world during that period; accordingly I must confess that I should much like to see a Commission or Committee, consisting of Officers of the Royal Navy and Royal Naval Reserve, appointed to enquire into the best means of improving the organization and efficiency of the important national auxiliary force known as the Royal Naval Reserve.

Admiral BOYS: Perhaps I may be allowed, Sir, to open this discussion by offering a few observations on this able paper which we have heard with so much interest. I may say, on the part of the Council, that they always welcome young Officers who will take the trouble to collect information upon any subject connected with the Services, and have the courage to bring that information before this Institution. I speak more particularly of Officers who are not immediately in the direct line of the Services, but who hold positions such as that held by Lieutenant Caborne in the Royal Naval Reserve, and Officers in the Volunteers, both military and naval. I will just touch upon two or three of what I consider to be the important points in this paper. Generally, I think the lecturer is to be agreed with, though perhaps some little differences of opinion will arise which will probably come out during the discussion. Looking down the list of Officers employed in 1859 and 1889 in the Royal Navy, the actual difference is that in 1889 we have 209 less Officers employed than in 1859, and considering what they had to do then and what they have to do now, the work of the Navy is so materially increased that I think this reduction does not present a promising aspect. The strongest point of the paper is that which is contained in a sentence to this effect: "Are our

various naval forces, as regards the personnel, alone equal to the great task of efficiently guarding the Empire in time of war? The insufficiency of matériel appears to be generally admitted." I think that is really the gist and burden of the whole question. There may be at this moment, and I believe there are, sufficient Officers and men in the Royal Navy and Naval Reserve to man the ships we have at present available for service, but that scrapes together every man on whom we could lay our hands. I understand the gunnery, the training, and the harbour ships will be emptied in order to complete the crews of ships which are available for active service. I do not think we have sufficiently anticipated the waste that must occur in the first few months or the first year of a naval war. The duties, especially of small vessels, will be very severe indeed. I think the experience of our fleet during the last summer's manœuvres shows that the crews of our small vessels at sea, especially the torpedo-boats and torpedo-catchers, will become in a few days thoroughly exhausted and must be relieved; and considering the small complements now appropriated to our ships, this will involve the actual necessity of a large increase in the Reserves. The smallness of the crews is one point well worthy of consideration at the present time. The crews have been decreased in far too great a proportion, and I think that this is to a great extent due to the Constructive Department of the Admiralty. One chief object of the Constructors of the Royal Navy is to reduce the weights to be put into a ship as much as possible, and every addition to the crew increases the weight in the matter of provisions, &c., and adds to the difficulties of the Constructor. With regard to this table of imports and exports, on looking over it, almost the only items in which the exports exceed the imports are those of biscuits and beer, and for both of these we depend upon the item of grain, for the flour and the malt to make them. I will, however, leave to others the task of discussing further points in this lecture. The urgency of the question of the Naval Reserves cannot be over-estimated.

Captain CURTIS: Having served in one of the Coast-guard ships in 1860 and 1861 at Liverpool, I think I can explain how it was that the men (Coast Volunteers) got mixed, and how they had so many very inferior men. It was in consequence of the Captains vying with one another who should get their number of men first, and we agreed in the Ward-room at that time that that was the cause of their enlisting so many men who were not efficient—not fishermen, as was the intention. There is nothing like practice. I was speaking to a fisherman mending some whelk baskets at King's Lynn. I said to the man, "Why don't you belong to the Royal Naval Reserve?" He said, "I did for seven or eight years, but I found they wanted to drill me when it was the fishing season." Now when you come to consider that 2*l.* 10*s.* is a second-class man's pay for retainer, you will see that it is not encouragement enough for a fisherman to belong to the Royal Naval Reserve, to be taken very often at his fish harvest. It would be very uncharitable to say that these men are not as patriotic as we are. I believe when you refer to patriotism, you should refer to the merchants or the world at large. The public get the benefit of the services of our soldiers and sailors, and the least the country can do is to pay a fair price for those services. I say we ought to get ten thousand men at the very least from the fishermen, and not only that, but we ought to improve the force. We have now only four hundred and fifty boys in the third class. There must be many boys in the fishing smacks that are quite eligible to be put in the third class, and if they had a little more pay you might induce these lads to join the Service, and thereby encourage as it were a growing force. With respect to drill ships, I think it quite possible for the Government to subsidize tugs for vessels on the northern and the eastern coasts, and to make those vessels eligible for steam tugs in peacetime, and also gunboats when required. In the event of war our fisheries would be very much curtailed in consequence of foreign gunboats, if not protected by a local force, and those are the very spots on which we should have efficient gun-vessels. I think Admiral Sir George Elliot has written a great deal on this subject. I quite agree with the lecturer that¹ the pay is the keynote of the whole

¹ I can confirm what Commander McLaughlin said about some of the Coast Volunteers not going aloft. On one occasion, when anchored at single anchor at Holyhead, the sails loosed and hauled to a bowline, a sudden squall came on, and the

affair.¹ I must congratulate Lieutenant Caborne on his paper. I think the Service must be very proud of him.

Admiral P. H. COLOMB: I think we must all have felt, during the reading of this paper, that we were hearing that which is to a great extent the product of the change of feeling which is taking place in this country. And I think we must also have felt that the expression of this change of feeling was exceedingly well put by the lecturer. As sentence after sentence came from his lips, I could not help saying to myself that we were listening to a paper considerably above the average. I think the lecturer carried most people with him in the way that he put the general case; but what was dwelling upon my mind throughout the whole of the paper was that our difficulties from beginning to end, in this naval question, have been that we have never had, from the departure of the days of sailing ships till now, any definite conception of what we were going to do in naval war. You have so many thousand men of the Royal Naval Reserve: what are you going to do with them when you have got them?¹ If you look at the material part, the ships in which these men must fight, you see that you have a great many more men than you can in any way at present dispose of. Then you say, "We have not anything like the number of ships we ought to have for the work they are going to do." But nobody can tell what the work is that they are going to do, and therefore these ships have been kept down to the small number at which they stand at present, and therefore it was that nineteen years ago Ministers were found to come forward and to treat the Navy of this Empire as a sort of necessary evil—to be kept down and to be screwed up as sharply as it was possible to screw it. But, not only so, the Ministers of those days were cheered on by the whole country for carrying out this highly national policy. We recognize that a change has come over the spirit of the country, and a paper of this kind, appearing at this moment, will have a much greater effect on the country generally than it could have had even last year, because people begin to think, "What does this all come to?" and the way in which the lecturer has put point against point, and matter against matter—bringing them both together—will give anybody reading the paper, or an abstract of it, subject for thought which will turn his mind in the right direction. I could not help feeling that the lecturer was striking a right note when he spoke of the Government looking out for a smaller class of vessels as auxiliaries, and staying its hand in making terms with these large class ships; and it is also not impossible that the proper crews of these ships will be Naval Reserve men. Anyone who has studied what the proper functions of the Navy are, will probably think that, on the outbreak of war, the hiring of a number of auxiliary merchant vessels will be a necessity, and if we bring together the Naval Reserve and the auxiliary vessels we shall find, in that idea, our hands much less tied than they are at present. Advertising to the numerous entries and exits of ships round our coast, with a total value of imports and exports of nearly 700,000,000*l.*, as the lecturer mentioned, it is obvious that they must have some protection near our coast, and it must be a very considerable protection, and a very widespread protection, if they are to go in and out freely. It appears to me, for that service alone, we should require a very considerable auxiliary fleet, and that if the Government saw their way to adopt the proposal of the lecturer, and to give small subsidies to ship-owners—especially to those who were engaged in trade in the vicinity of our own country—and were to induce them, when they built new ships, to make them more suitable for the purpose of protecting the coast trade, and if we looked upon these as properly manned by the Naval Reserve, we should then have a distinct object in the maintenance of the Naval Reserve with its Officers in a proper state of efficiency. The difficulty

men were required to haste aloft to furl sails. Some eight or ten declined to go—said their heads would not bear it; one man said a load of muck had fallen on his and injured him. They were put under the sentries' charge and afterwards discharged as unfit. I am certain no fisherman would refuse to go aloft.—J. C. C.

¹ It would be very much to the advantage of fishermen to belong to the Reserve in event of war, as many of the trawlers would not have employment for fear of capture or destruction.

at present is that we really do not know exactly what it is that we ought to do. There were many points that I took note of as the lecturer proceeded, but I should not like to intrude too much on your time: I would not intrude on your time at all but that I fear few of us are going to be stirred up to do our duty on this occasion. With regard to the question of engineers and stokers, I do not know what causes this small number of entries of engineers; it certainly is very remarkable. I was not aware that it had been so very small. Engineers and stokers are a class that are thoroughly trained for the work they would have to do. As they stand they are capable of doing their work on board any ships, having already been trained to it. I do not disagree with the lecturer in the belief that it would be advisable to add to that training the training in the use of arms. I quite hold with the view that a training in the use of arms and training in discipline, if only for a short time, is an advantage. The foreign element in our mercantile marine is an evil which we have been deploring for years, and the worst of it, as far as I can understand, is that it is a continually growing evil. I have been told since I came into this theatre, by one who is eminently qualified to know, that why our mercantile marine men sometimes get the bad characters they do (which are not always deserved) is, that the best of them quit the Service unable to stand the rough way in which they are obliged to live when mixed up with all sorts of nationalities and in close contact with them. But the difficulty here is, that if we will not look upon the mercantile marine as a national affair—as a standing part of the British Empire to be upheld by legislation—I do not see how we can alter things. As far as I can see, as long as the mercantile marine is open to competition we cannot touch it by legislation; and though I am, so to speak, a free-trader, yet I must say I never have been a free-trader with respect to our mercantile marine. I have always thought that our national existence may depend upon the sustenance of that grand body, and that no Government would be ill-advised which gave some advantages to our ships, while at the same time they compelled them to do something in the way of a greater employment of the British themselves, instead of foreign races. I was glad to hear the lecturer say that modern seamanship was seamanship still; that the seamanship of steam days is just as important as the seamanship of sailing days—just as difficult to be learned, and just as important when it is learned. I do not for one moment believe in that opinion—which sometimes grows—that anybody can go on board a steamer and do what he likes with her. I feel with the lecturer in his complaint that the Royal Naval Reserve is not in closer touch with the Admiralty. If it can be brought into closer relation it would be better both for the Admiralty, as enlarging their sphere of action, and for the Reserve itself. The scattered state of the Reserve has often been alleged as an objection to it, and I think the lecturer usefully met that by pointing out the fact, which I had forgotten, that less than one-fourth of it is all that we could not lay our hands on at home if war were declared to-morrow. I have always heard from every Officer who has had to do with the Naval Reserve, that there is no doubt but that they would flock to the colours directly they were wanted. I am sure we may put implicit trust in them. I think we had good proof of this when at one time there was a great war scarce—that was the time when there was the greatest enrolment of Naval Reserve men. I did not like to hear the lecturer talk about “a bolt from the blue.” It is an enemy of mine, that “bolt from the blue,” for the moment you begin to say sudden unexpected things will happen, and you cannot be prepared for sudden things, then people say, “Don’t let us prepare at all.” That is the general argument which goes on all round, and “as you cannot foretell everything that happens—and things may turn out differently from the way in which you foretell them, therefore let us suppose that we cannot foretell anything, and do not let us be prepared for anything,” which is a policy I do not like. I think the lecturer’s table of food supply is most useful. I should like to see it published pretty widely. We are so accustomed to be told that we shall starve, that we seem sometimes to accept the position and act on it. But when you put before a man the sort of things which he is not going to get, and tell him that he is not going to have one loaf instead of three, and that he is not going to have any coffee or tea for his breakfast, he is apt to think about it a little more closely than he would if he were only told that he was going to starve in a general sort of way. I should be glad, if it were possible, to see

something done in the way of Reserve petty officers. I do not know enough about the subject to say if it would be possible to do it, but I think the lecturer is right in supposing that on a declaration of naval war there would be a considerable laying up of sailing ships and of the slower class of steamers, and that therefore if we organize beforehand these sailing vessels and the slower class of steamers, and make arrangements for obtaining their men when we want them, and training them, I think we should be pretty certain always of a large supply in that way. But our scheme, whatever it is, must be a complete scheme. We must know what ships we are going to have before we can settle what men we are going to put in them, and we must always work side by side, ships and men, and men and ships, or else we never can have a perfect Navy.

Commander C. McLAUGHLIN: There are only two points I should like to speak about, since they have been alluded to by the lecturer and the last speaker. I was Second Lieutenant of H.M.S. "Donegal" at Liverpool, in 1868-69, to which ship about 1,000 Royal Naval Coast Volunteers came for drill each year,¹ and I was responsible that their instruction drills were carried out; but we found that the men were not up to much; one reason being that they were not the men they represented themselves to be, and we could not detect it. A man would bring a parchment in a little tin case, stating he was John Snooks, a fisherman; but when sent aloft for work he tumbled down, and turned out to be James Stiggings, a tinker, the latter having taken Snooks's parchment and come up for drill. Whilst in H.M.S. "Donegal," I was in that cruise which the lecturer has spoken about when the Royal Naval Reserve were called out. We embarked nearly 1,000 men and 2 Officers as the Liverpool contingent.² The question then came what duties were the Officers of the Royal Naval Reserve to do? and I think our Captain telegraphed for instructions to the Admiralty, who replied, "That he might make his own arrangements." One Officer, who was a very senior Lieutenant in the Royal Naval Reserve, I think about the most senior, undertook to be the medium between the Royal Naval Reserve men and the ship's Officers generally; and the other one was assistant pilot, *i.e.*, helped the navigating Officers; but that was our difficulty, we did not know what to do with the Officers then. I do not know whether that difficulty has been now overcome, but think it has hardly been touched on by our lecturer in the very able lecture he has given us to-day.

Lieutenant W. S. BADEN-POWELL (Royal Naval Reserve): I should like to offer one or two remarks upon this subject, and the very last words of the last speaker, I think, go to the bottom of the whole question of the present status of the Royal Naval Reserve in regard to the Navy. The Royal Naval Reserve has been a child badly brought up. It was brought up in the first place without Officers, the Officers were appointed to the Royal Naval Reserve, but their status was not understood on board ship. I believe, at the present day, if a body of the Royal Naval Reserve were sent on board a man-of-war, that there would be some difference of opinion amongst the Captains and Officers of the ship as to what duties these Royal Naval Reserve Officers were competent to perform and ought to perform on board. The fault, I think, is the training. I hold that the Naval Reserve Officers ought to be regularly trained on board a man-of-war—not on board a drill ship; either on a man-of-war at sea or on one of the naval drill ships, such as the "Excellent," or the "Vernon," because they would there learn those details which alone can fit them to take their proper station when they go to sea in a fighting ship. Fraternity would then exist without a breach between the two branches of the Service. I have mixed a great deal myself with naval Officers, and have noticed a sort of feeling that a Naval Reserve man was a very good sort of fellow, but still he was a "mercantile man," but I venture to say that in this country at any rate, the sooner the hand is joined between the Royal Navy and the mercantile marine, without the slightest distinction, the better it will be for the country. The lecturer has also touched upon the subject of the Royal Naval Reserve, in connec-

¹ They embarked in batches of 200 for twenty-eight days' drill.

² On joining the Fleet at Portland some 500 or 600 of the Royal Naval Reserve were sent from us to other ships for the cruise, and returned to us when it was over.

tion with the Admiralty, and I think it must be patent to every gentleman here present that it is absolutely absurd that a Naval Reserve Force, instead of being in touch with its head and its commander, the Admiralty, should have to go through a trade department, the Board of Trade, simply, I presume, because there is some official at the Board of Trade who is supposed to be the guardian angel of merchant seamen—a sort of Assistant Registrar-General. What is the fact? Why, that every Reserve Officer who wishes to communicate with the Admiralty is bound to do so through the Board of Trade; the Board of Trade is entitled to read the letter to see what he says, and to forward it on or not, as they think proper. He has no direct communication with the Admiralty, he has no right to appeal, and if he makes matters a little too hot he may fear lest he be imperilling his certificate or his general comfort in the mercantile marine. I think the two Services, viz., under Board of Trade certificate and under Admiralty Commission, should be completely cut asunder, so that if a man is willing to serve his country in the Reserve, his private occupation with regard to serving merchant-owners, under certain statutes, should not be allowed to have any connection or touch whatever with his public service to the State. Then we have touched upon the question of commerce going under a neutral flag in time of war. That of course depends, as the lecturer has put it, upon whether certain international law is going to be kept to as law in war-time: and I have not the slightest doubt myself that, as soon as we have a general European war, all those little details of the international pledges—apart from the Law of Nations—those pretty little things that certain professors get up in time of peace, will be swept away, and that the enemy's goods, when we are the enemy, will be considered capturable wherever they are get-at-able. I very much doubt whether our goods will be allowed to go untouched under a neutral flag. What will be the result? We must have fast steamers to bring our food; we cannot trust to a neutral flag at all events, we must have fast steamers, and we must have the men to man them. At the present moment the lecturer has put down that there are 15 per cent. of foreigners serving in our ships; I should think that it is more like 25 per cent. I do not know whether I am right. I have seen the statistics to a certain extent, but I am inclined to believe that it is as much as that, for this reason,—that there are in almost every merchant ship a large number of men who call themselves Englishmen who are really nothing but Swedes, Turks, Norwegians, Maltese, speaking English, many of them holding English certificates; they are entitled to go to the Board of Trade for examination, and to go to a merchant and say, "Look here, I will take half the price that your thundering Englishman will take, ship me as mate;" and he goes on board, bullies the men and drives them about. That is what makes our mercantile marine, in the smaller ships, distasteful to young Englishmen, who would otherwise make first-class Officers. They make one or two voyages, and then chuck the thing up, and go into a shore-going line. If we could only get the country to see the danger we are in in not keeping up the supply of seamen and Officers which may eventually be drafted into the Navy, it would be a very good thing. The difficulty is to get the country to see it. It is easy enough to see that each British ship shall carry so many per cent. of Englishmen, or so many per ton, and then merchants will not find it pay to carry foreigners, and we shall have an industry opening for our British seamen to go into, and make a profession of it and carry it on. There was one question as to the capture of fast steamers. Now, of course, the naval manœuvres last year were very good for the country, but I cannot think that any seaman or expert would say that those captures which were made represent in the slightest degree anything that would take place in the time of war. These merchant ships were unaware that the cruisers were about. They did not care for capture, their only business was to carry out the owner's orders, to get to port in the usual course, and they did not even take the trouble to run away. Of course it is easy to see that if a foreign cruiser were on the station and she had to chase one of these ships all day, and another ship the next day, and another the next, by that time she would have precious little coal left, and she would have to go away for her own safety without molesting any more ships. With regard to the question why the ranks of the Royal Naval Reserve are not filled up, the fact is simply this, that men who have served for twenty, thirty, or forty years

at sea do not care to take subalterns' positions. They do not in these days get a Lieutenant's commission without having served as Sub-Lieutenant; and even if they get a Lieutenant's commission it is not very much. There are many opportunities in war in which, at least, Officers of the rank of Commander could be used, and when you get sufficient rank given to a man he may say, "Well, it is worth my while for the greater rank to go into this Service." I think it has been treated rather too much on the idea that a man would jump at it simply because he would have the privilege of wearing a sword and a cocked hat. That is not the way in which the Royal Naval Reserve Officers look at the matter. If they serve in the Reserve at all, they do it as a national public duty, because their life has been spent at sea, their instincts are in the sea, and many of them have that nasty roaming spirit which used to make pirates and privateers; an instinct that if there is a row they hope to be in it, but in the Navy. That is the national spirit which has made us the maritime nation that we have been, and that I hope we are still going to be. If the country would only see it in that light, and make the Reserve more comfortable to the Officers and to the men, give them more cruising instead of relegating them to fourteen days in a drill-ship, which is very much like putting men into a prison-yard where they cannot move, some good would be done. The men do not get drill enough, they do not get discipline enough; you allow them to be trained under a seaman gunner. What you want is a smart Gunnery Lieutenant to hurry them round and show them their drill and duties properly, and then they will not be ashamed to go on board a man-of-war and show what they can do. There is only one other thing which I will touch upon, and that is that as the Naval Artillery Volunteers have been mentioned, I think I shall not be departing from the strict order of this lecture if I here say that the Naval Reserve must be kept entirely separate from any idea of a local Volunteer force, it must be a national force. The Naval Reserve must be a national force capable and liable to serve with the Fleet wherever it may be. The Naval Volunteer is also a force national, not local, and under the Act is liable to serve in the British Fleet around the home waters. There has been a movement lately going on throughout the country, going to different ports and asking them to raise Naval Volunteers, to man, and arm, and fit out tug-boats and barges for the local defence. That is a very good move, if the local people like to do it, but I venture to say it ought to have nothing to do with the Royal Naval Reserve, nor with the Naval Volunteers, because it is in effect placing a naval force under the orders of the Mayor or the police of the township; whereas the entire force ought to be, and must be, under the orders of the Admiral on the station, and at his direct beck and call. So that if we have vessels fitted out for them to work in, those vessels must not be simply the property of one port and thus not available to go to another; they must be ready to go wherever the Admiral on the station may say that they are wanted. I think that a great difficulty, and a very grave difficulty, will arise in war-time if private individuals were allowed to fit, man, and arm vessels at certain places for their own defence. They would immediately demur to those defences being taken away simply because the Admiral on the station said, "Why, here is Aberdeen threatened, you people from the Forth must send your gunboats and torpedoes up to Aberdeen." Naturally the private individuals would say, "Our private property shall not go from the Forth." That would bring chaos, and it ought not to be mixed up with any Naval Reserve scheme in this country.

The CHAIRMAN: This has been a very interesting lecture. There has been a great deal to be learnt from it, but there is, undoubtedly, a great deal of misapprehension existing. If you look at the thing patiently you will see that the great objection to the old Coast Volunteer was the personification of other people—another person coming and claiming the fee, giving a wrong name, and cheating the Crown. The great object of establishing the Royal Naval Reserve was to have the means of identifying the Naval Reserve men. The Board of Trade are bound by Act of Parliament, when men are discharged and when men are entered, as far as possible, to ascertain where they live, their national domicile, and to be ready to give them advice, as shipping-masters, if they should ask for it. Therefore the natural course, when you are establishing a Reserve from the mercantile marine, is to go to the Board of Trade and to ascertain from it who these men are, and whether they are

available. Now, the Naval Reserve is in much more touch with the Admiralty than many of the speakers have thought. Every week—every month certainly—constantly, every week, the name of every single Naval Reserve man available in the United Kingdom is laid on the desk of the Admiralty Superintendent of Naval Reserve, who is responsible to the Admiralty for them. The Admiralty know exactly, to a man, the number of men who could be brought from the Naval Reserve, and in twenty-four hours they could send to them. They know who are employed at home and who are employed abroad; and it would be impossible to do that without the machinery of the Board of Trade—and very effectively does the Board of Trade, on the whole, do that work. It is a marvellous thing, and rather a humiliating thing, that, as a matter of fact, we have in the Royal Naval Reserve the cream of the men of all the merchant steamers. I do not suppose there are in the kingdom 4,000 more able seamen available than we have now in the Royal Naval Reserve. These things are so remarkable that, until the facts were put before us, it was perfectly incredible. As a matter of fact the number of sailors discharged before they even complete their voyage is 49,000 yearly! What with desertion—what with imprisonment—what with sickness—what with those who die and those who are discharged, there are, in point of fact, 49,000 men in trade in this country whom you may assume you would not like to have to trust upon in a Naval Reserve from different causes; they get disgusted with their ship—some get into scrapes—some are away—some are helpless. Then the number of people rejected by the Medical Officers of the Royal Naval Reserve is very considerable; it is about 6 per cent. The number of foreigners is also very great. Some time ago it was 21,000—but the number now is 24,000, and, as has been well said by one speaker, that is only the number of those who are entered as foreigners; but there are a great many who are foreigners and half-foreigners who are not entered as foreigners, and those people would diminish the number of men available, very much. There is another item: the number of stewards and servants on board the ships, and the men who do not go aloft. The number of these men who are not trained was 30,000; and I believe now that number is very much increased. There are a great many men who enter for the trip; they do not come back, and they are not what you would consider as sailors. There is really no difficulty in filling up the numbers of the Naval Reserve if you are indifferent to quality. But here again you are confronted with a very great difficulty. The expenses of the Naval Reserve, I suppose, in rough figures, since its establishment, have been between six and seven millions sterling. For these six or seven millions no man ever yet has been called upon to serve—and there are a great many men in receipt of pension as Naval Reserve men. Therefore, in the way we have it, it is an expensive Reserve—not a bit too expensive. The number of the second-class Reserve could be increased at any one moment, probably, that you liked; but there again, among the highlands of Scotland, a great many of these people do not speak English, therefore you must leave the Reserve to enter those men whom they think most desirable. I believe we get the full worth of all our money. I do not think there is a finer body of sailors to be seen in any other country in the world than our best Naval Reserve. But for all that there is no use blinking the question. The whole number of our Reserves are totally, and entirely inadequate to what we should want. When you look at the old naval histories you will see Lord Keppel, when First Lord of the Admiralty at the conclusion of the American War, even 100 years ago, announced that we had then afloat 150,000 sailors, including marines. Now we have only 9,000 first class, 8,000 second class, and 2,000 Volunteers; but they give the country the nucleus of a most valuable body of men—they do give the country sufficient to say that if there should be war to-morrow we can man every ship in every port. It is quite true there is a considerable want of provision for war in the Navy. No doubt four or five years ago we had not ships enough which we could have got ready to have escorted our home-bound fleets and to protect our shores. Gradually and steadily the numbers are increasing, and we shall want as many men as we ever did before. Look at the enormous wealth of this country; and to suppose that our coast can be protected without a fleet of gunboats to keep it from privateers is to suppose that really the dread of your name is to last for ever; that is my view of it. I think that we all are much obliged to the lecturer for his admirable paper, and I am sure there is nothing I have said that was meant to diminish the value of his paper.

Lieutenant CABORNE: Captain Curtis said he presumed that I referred to merchants and ship-owners when alluding to patriotism.

Captain CURTIS: To people generally; not to our own fishermen.

Lieutenant CABORNE: It was a general remark. The engineers of the Naval Reserve are, as Admiral Colomb said, practical and capable men, but it would be a very great advantage indeed if they were permitted to serve for a time in the Royal Navy, as, in addition to becoming acquainted with the leading features of naval routine and discipline, they would learn a good deal about torpedoes, hydraulic machinery for turrets and guns, &c. The stokers of the Royal Navy are taught gunnery and rifle exercises, and although from a naval point of view it might not be considered necessary that the same instruction should be afforded to the stoker section of the Reserve, yet the habits of discipline which the men would acquire while undergoing drill would be very beneficial. My own experience has been that the mercantile marine stokers, as a rule, give more trouble than do the sailors. In reply to Commander McLaughlin, I can only give my personal experience, and mention that during the twelve months I served in the Fleet I performed precisely the same duties, and was treated in exactly the same manner, as the Lieutenants of the Royal Navy. I may add that I have a very pleasant recollection of the cordiality and kindness which I invariably received at the hands of all ranks in the Service. The main object of the Reserve Officers serving in the Fleet for twelve months is to enable them to become acquainted with the general routine of a man-of-war, and in the time named they can, I think, pick up all that is requisite. Gunnery and field exercises can be better learned by going through a course in the "Excellent." Referring to the subject of foreigners in the merchant service, I beg to state that I took my figures from the official Returns, but it is quite possible that the real number greatly exceeds the 15 per cent. given. It is true that the ranks of the Naval Reserve are almost filled up to the number sanctioned by the Admiralty and the Treasury, but I consider that the strength allowed is insufficient and should be increased. Apparently, Lieutenant Baden-Powell is not aware that, upon complying with certain conditions, Officers of the mercantile marine can now join the Naval Reserve with the rank of Lieutenant. I cannot say that I am altogether in favour of this rule. In fact I think that some of the regulations for Officers of the Royal Naval Reserve require revision. Unless the men of the Naval Reserve are drilled with modern weapons they cannot be expected to be efficient when called upon to serve afloat. I imagine that the vessels upon which they will be embarked for service will be principally armed with quick-firing, machine, and 4-, 5-, or 6-inch B.L. guns, and it is instruction in the use of these weapons that I now advocate. I should like to see Gunnery Lieutenants appointed to the "President" and the "Eagle," for many reasons; some of those reasons I need not enter into now. However, I may say that there are many of our Officers who possess very little knowledge of naval customs and etiquette, and if they had a young Gunnery Lieutenant to mix with them, to superintend their drills, and to instruct them generally, very satisfactory results would accrue. Our Chairman (Sir Augustus Phillimore) appears to think that it is absolutely necessary that the Board of Trade and the Registrar-General of Shipping and Seamen should deal with the Naval Reserve. At first it was so. Men would not have joined the force had it been placed directly under the Admiralty, as they were afraid of being entrapped into the Navy. That was one reason. Then again no one else knew anything about the merchant seamen and how they were to be got at. All that is now changed. I admit that at the present moment you cannot do without the services of the Registrars of Naval Reserve; their lack of status as Board of Trade officials in connection with the force appears to have been recognized at the Admiralty, and many of those gentlemen have been granted honorary commissions as Paymasters and Assistant-Paymasters. It is impossible on this occasion to discuss the manner in which the very desirable change should be effected—there is no real difficulty—but I know that the Naval Reserve could and might be brought directly under the Admiralty with advantage to all concerned. Even if the present system were defensible as regards the men, it would be wholly indefensible as regards the Officers. I advocated an increase in the second class, because of its cheapness. You only pay a man a retainer of 2*l.* 10*s.* a year as long as he serves, and when he is too old to serve any longer you do not give him a pension. You cannot get him cheaper than that.

Captain CURTIS : It is not enough.

Lieutenant CABORNE : There is a difficulty in attacking the Treasury.

Captain CURTIS : You cannot get the men.

Lieutenant CABORNE : I think you can get the men without difficulty if the authorities will allow the number to be increased.

Captain CURTIS : I asked a fisherman direct, and he had been in the Naval Reserve. He said he could not do it for 2*l.* 10*s.*—a man with a wife and children.

The CHAIRMAN : It is not really 2*l.* 10*s.* ; it is 6*l.*, if you take the allowance for provisions and clothing. Every second-class man really gets 6*l.* a year from the Admiralty.

Lieutenant CABORNE : I think it comes to 7*l.* 12*s.*

Captain CURTIS : That is for a week because he is only to drill twenty-eight days.

The CHAIRMAN : It is 6*l.* a year for every second-class man and 10*l.* a year for every first-class man.

Lieutenant CABORNE : Then there is the suit of uniform ; it is really about 7*l.* 12*s.* he receives.

Captain CURTIS : He gets 7*l.* 12*s.* for twenty-eight days and the risk of being shot.

Lieutenant CABORNE : We all incur that risk, and some of us do not get so much in proportion.

The CHAIRMAN : I do not think there is anything more to do except to express our thanks to Lieutenant Caborne. I should like to have said one word more for fear there should be any mistake about it. There is no country that is so much indebted to its merchant seamen in the past as this country. In the olden wars, when the merchant ships were laid up, the mates and masters of those merchant ships constantly found their way into the Navy as well as the men. They often entered as master's mates ; they often entered in the navigating line. They became masters and pilots. They often rose to the highest ranks the Service could give. There are many names, if you go back into the past, men like Sir Cloudesley Shovel, that came in from the merchant ship. One man I knew myself, said to me, " I was a second-class boy at Shields, and I filled every rank in the Navy from side-boy to Rear-Admiral."

Note.—The Registrars of Naval Reserve receive an allowance from the Naval Estimates, a contribution towards their pensions is also made from the same source, and, as I have already stated, many of them hold Honorary Commissions in the Royal Naval Reserve. Such being the case, those officials, as regards their Naval Reserve duties, should most certainly be brought directly under the Admiralty.
—W. F. C.

Wednesday, February 6, 1889.

REAR-ADMIRAL P. H. COLOMB, Member of Council, in the Chair.

ON COALING SHIPS.

By Lieutenant T. Y. GREET, R.N.

(Read in his absence by Mr. R. A. Baillie, C.E.)

ANYBODY who witnessed the Manœuvres of 1888 must have been struck by the deplorable condition of the coaling arrangements of the Fleet. This, the most important factor in the whole science of naval warfare, appears to have been lost sight of in the great, and certainly very important items, of speed, armour, and guns. Yet what will be the use of these, if the ship cannot move for want of the means of propulsion? Take one example—there are many—the Blockading Squadron off Lough Swilly. It must be remembered that the enemy was in his own port, he could constantly replenish his bunkers. But how different the case of the Blockading Squadron: they were always on the move—which meant using coal, especially as they had to be ready at short notice to go full speed—and the consumption of these big ships is considerable; in consequence, one or more of them was always out of action, filling up with coal, so that really a fleet of ten ships can only be considered one of eight. Now, while these two ships are coaling, the remainder are steadily but surely eating away at their coal; suddenly the blockade is broken, the Blockaded Fleet shoots out well filled up with coal. The Admiral of the Blockading Fleet follows, but how far? His ships have only half their bunkers full, or perhaps some are nearly full and others nearly empty, and to his disgust he has either to give up the chase, or risk capture through going on with an inferior force; or perhaps in the excitement he forgets that coal is running short in some of the ships, and they have to be left behind to their fate, or towed by others into a port. Can anybody imagine anything more heartbreaking or more calculated to lead to disaster? Yet I think this must have been apparent to every man in the Fleet. Surely the time has now come when this all-important question should be given the attention which it merits; let speed, guns, and armour rest awhile—not a bad idea, as people appear to be getting somewhat mixed on those subjects through over-attention—and they will then be able to go back to them with redoubled vigour, their minds strengthened by change and rest.

Now, let us see some statistics on this coaling. Luckily, during

the manœuvres the weather was for the most part fine; it might be otherwise. In the first place, ships had to go some distance to a harbour; this meant coal both to get there and also to return to the Fleet, as it had to be done at a somewhat quick rate of steaming, coaling at sea under the present arrangements being almost out of the question, yet it could be done in very fine weather. Private vessels are afraid to go alongside a man-of-war, even in very ordinary weather, for fear of getting stove in; of course this is natural, but it will not do on service. The Admiralty ought to have their own colliers. The following are some of the times taken in coaling:—

“Agincourt,” at Plymouth, with a large lighter on each side, fitted with derricks and steam winches and every facility, owing to her numerous ports	}	500 tons.	12 hours.
“Iron Duke,” at Plymouth, with one lighter, but having only one hatch, consequently only able to coal in one position			
“Iron Duke,” at Portsmouth, a jetty on one side, and a lighter on the other, bags being already filled	}	330 „	22 „
		55 „	2½ „

At Spithead, it was really pitiful to see a lighter with two small derricks coaling a ship, one bag going up at a time. The above are the arrangements at the two principal Naval Arsenals in the Kingdom.

Now, from colliers at Lamlash, which may be taken as an example of what would go on in war-time, and which had two hatches and two steam winches—

The “Agincourt” took in.....	187 tons.	9 hours.
The “Shannon” „	146 „	12 „
The “Iron Duke” „	167 „	9½ „
The “Tartar” „	53 „	6 „
The “Neptune” „	250 „	10 „
The “Inflexible” „	227 „	12 „
The “Inconstant” „	197 „	13½ „

At Sheep Haven, in a heavy swell, and coaling all night in pouring rain from a collier—

The “Iron Duke” took in.....	116 tons.	9½ hours.
The “Iron Duke” took in, at Lockandaile	220 „	9 „

In the Downs from horse-boats carrying about 12 tons, which had to be hauled to and from the collier to the ship, and using cutters for towing, bags being filled by men from ship:—

The “Iron Duke” took in.....	97 tons.	12 hours.
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The following gives some idea of what is at present considered smart work in coaling:—One Commander signals to another, “375 tons in 19 hours, what do you think of it?” Yet considering that ships carry 1,000 tons as a rule, this would mean a ship being out of action for nearly three days; and one has to consider what would be the result to the men? They come away from a blockade harassed and worn out by the anxiety of night and day look-out and constant attack by torpedo-boats, to have three days of utter discomfort and

extreme hard work, which I venture to say would swell the sick list to an alarming extent, and so tend to cripple the fighting capabilities of the ship, as every man is a fighting factor.

Now, from the foregoing, it is evident that what is required is that a ship should be able to take in her coal on her station in the blockade, and at a very quick rate; also that she should constantly replenish, and so be ready for any contingency. There is a great advantage in filling up frequently before too much is used; if necessary a portion, according to deck space, can be left on deck more conveniently and stowed at leisure, as everybody knows it is the last part of coaling that takes so long on account of the stowage. This leads us to another matter which greatly needs alteration, that is the present shape and position of the bunkers and the means of filling them. It would appear as if when the ship is designed everything has its place allotted, after which the remaining space, mostly holes and corners, is designated "coals:" therein lies a great cause of delay. Why not make the bunkers of plain shape; wing bunkers round the engines and boilers, and plain boxes going right across the ship before and abaft the boilers? These would dispense with the numerous holes in the deck, and their shoots, also with having to move the coal about the deck to them from where it comes in. Then instead have a trunk or shaft of convenient size cut in the deck fitted with a sufficiently strong hatch of iron, and from this, shoots at an *angle* to carry the coal to all parts of the bunkers; if any trimming is required these shoots can be cut off by dropping a shutter in them.

Let us refer to the various methods now in use at the different yards.

It seems strange that the coaling arrangements at present are practically the same as they were when steam was first introduced into the Navy, although the subject has been several times discussed in this Institution. The only difference that I can see in the last twenty-one years is that we have borrowed from abroad the system of coaling with baskets, this only at the western port; and canvas buckets holding about 78 lbs. are now on trial. Of course the cheapness of native labour renders coaling abroad quicker on account of the number of men that can be employed, and these men do little or nothing else; but this description of labour makes them, being barefooted and having little clothing to hamper them in their movements, adepts at it.

At the western port, alongside the dockyard, the coaling is done by means of carts (carrying about a ton each load) which bring the coal from the shed and shoot it alongside the ship; it is then passed in through the ports by means of baskets holding about 100 lbs. each.

By these means 600 tons are taken in in $15\frac{1}{2}$ hours. Here it depends upon the rapidity of the carting, the endurance and the smartness of the manual labour.

For coaling in the Sound, hulks are fitted with derricks and steam winches; some of these only have one hatchway, consequently, most of the older ironclads and vessels can only coal from one position at a time, which is a great source of delay; this is especially the case with vessels having a battery, and, consequently, few ports. The coal

in these hulks is in bulk, and is got on board in bags, which have to be filled by men from the ship coaling.

At Portland, the bags are first filled at the coal wharf by men from the ship coaling, they are got into lighters fitted with no appliances, and then hoisted on board. This is a very tedious process.

At Portsmouth, the coal bags are generally ready filled at the wharf, and the lighters also are loaded with them, whence they are hoisted in by the ship's appliances.

The system of loading by baskets is certainly by far the best at present; it is a question whether the smaller baskets used abroad are not better, especially if they were supplied for coaling from lighters, which is not the case at present. At Sydney, Cape Breton Island, vessels go alongside a wharf, down which trucks are run, and their contents, about $4\frac{1}{2}$ tons, are shot on to the deck of the ship.

The system advocated in this paper certainly has the following advantages over any other at present adopted, viz.: (a) Is quicker, (b) much cheaper, (c) more efficient.

(a) It is quicker, because a continuous stream of coal is always pouring into the bunkers, and there is no delay hooking on bags or filling them, nor cause for desire to "stand easy" among the men, few of whom would be required, which would be a great advantage in war-time.

(b) Cheaper, owing to saving in the cost of coal bags, which quickly wear out, and many of which are lost overboard. It would save transshipment (at present transshipment occurs twice) if colliers are used instead of the hulks as at present, and cost of hulks' crews will be saved. If there were two of these colliers of about 1,000 tons each at each port, one of which could always be loading while the other was at Spithead or in the Sound supplying the fleet, and a wharf with tipping-trucks for the harbour, coaling would not be the lengthy operation it is at present. This, I submit, would be a great saving to the Admiralty.

I am not quite certain about my figures, but am not far wrong. Welsh coal costs 7s. per ton at the pit's mouth, and north country coal 5s. Freight to Plymouth is about 4s. 3d., and to Portsmouth per ton 4s. 6d.; these are low prices. The transshipment from collier to yard or lighter, roughly, 1s. 2d. per ton; this makes the cost per ton to the shipper, taking the average, about 11s. 6d. The rate-book says the contract price is 15s. 2d.; perhaps the Admiralty put something on for maintenance of hulks, cost of bags, general wear and tear, &c.; but I think the Admiralty might save at least 5s. per ton by having their own colliers fitted in the method below described, and have far greater efficiency; in time of war it would be almost imperative that they should have their own vessels, of whatever description used, for the reason I have before mentioned, and because merchant captains at present are afraid to go alongside a man-of-war, and there are other reasons which will occur to all Naval Officers. These vessels could be classed in the same category as the yard craft, and the saving in the expense of coal would soon pay for the building of vessels. In the case of transshipment to the harbour depôt, the new collier would

discharge the coal at a much lower figure into the trucks, and at a much quicker rate.

(c.) It is more efficient because practically automatic, and not dependent on manual labour.

With regard to coaling at sea, under the same conditions of wind and weather, it would certainly have the same advantages over the present system there as it would have in port.

I think it hardly necessary to discuss the way in which the coaling is done on board a man-of-war. But suffice it to say, it is done by whips from yards, stays or derricks rigged over the ports, manual labour and steam capstan being the power employed.

The following is a description of the vessel and her appliances:—

The collier can be of any size, and fitted out as a sea-going vessel, with engines of sufficient power to insure a good speed.

The coaling apparatus is worked by steam supplied from the main boilers; this is important, because no donkey or auxiliary boilers are required. The exhaust steam from the coaling machinery is carried back to main condensers in engine-room, thus keeping the water in main boilers in good condition, as no waste is required to be made up by sea-water feed.

The coal is delivered on board the ship through telescopic iron tubes or shoots, direct into portable funnels; or the spout on the end of shoot is placed directly into the bunker hole in the deck, and the delivery is regulated by the speed of coaling machinery, and may be from 20 to 200 tons per hour, as found most convenient.

The holds are ceiled at sides and bottom with light plating to secure a smooth surface and facilitate the flow of coal to lower ends of booms.

The collier is fitted with six bulkheads. The machinery for working the cargo is fixed between the two midship bulkheads, and consists of one pair of small engines to work the coal buckets, and another pair to lift and lower the hopper and coal shoots.

Heavy wood rubbing pieces are attached on the sides and gunwale.

The forward part below deck is conveniently fitted up for berthing the crew. The after part below deck with cabins, &c., for Officers. The lavatories are placed under the bridge deck forward.

When in special cases of build, ballast is required, the ceiling in bottom of holds is made thicker, the space between ceiling and bottom forming a very convenient water-ballast chamber.

The price is of course dependent on the requirement and capacity, the larger the collier the less cost per ton.

The coaling of steamships is by this method performed very quickly, at minimum of labour and dust.

On account of the sponson ports and overhanging gear on a man-of-war's sides, the collier should carry very large fenders of about six feet in diameter; there would then be little chance of damage being done to either collier or warship. These fenders could easily be made of a suitable material giving lightness and elasticity, for instance, coir rope.

An exact position with regard to lying alongside is not necessary, as

the end of the coal shoot is quickly guyed to any particular bunker-hole where the coal is required. This is a very important feature, as it gives the men time to carefully trim the bunkers, and not interfere with the steady delivery of coal.

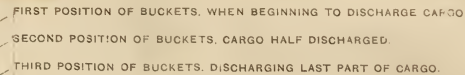
The coal is delivered into the telescopic shoot from a hopper supplied by buckets, each of one hundredweight or other suitable capacity, attached to steel endless chains, working on barrels on the ends of a light steel-plated boom. The upper ends of booms are hinged on the barrel shaft working in bearings secured to the hopper. The hopper is guided vertically by the light plated steel columns, and lifted or lowered by screws attached to under side of hopper, worked by suitable machinery placed in the centre compartment under deck. The elevation of the hopper is decided by the position and level of coal in the holds. The two operations, viz., elevating coal to the hopper, and lifting or lowering the hopper with coal shoots attached, are quite independent of each other and simultaneous, and manipulated from the same locality; when the last part of the cargo is being delivered, the hopper is at its lowest position, with the lower ends of bucket-booms at the farthest ends of the holds. At the commencement of discharging cargo, the traveller-wheels on lower end of booms are resting on the surface of the coal. As the cargo is being discharged, the booms gradually radiate to the position tinted blue, the traveller wheels resting on the bottom ceiling plating, then by lowering the hopper the ends of the booms travel to the extreme limits of the holds. The operations of elevating the coal to the hopper, of lowering or lifting the hopper with coal shoots are entirely in the hands of the engineer, and made at intervals or continuous as may be convenient.


When making the voyage the apparatus is lowered to the position shown, the light steel-plated columns being telescopic, the coal shoots are turned fore and aft, the whole occupying the small central deck space shown on plan. The whole apparatus then offers very little surface to the wind.

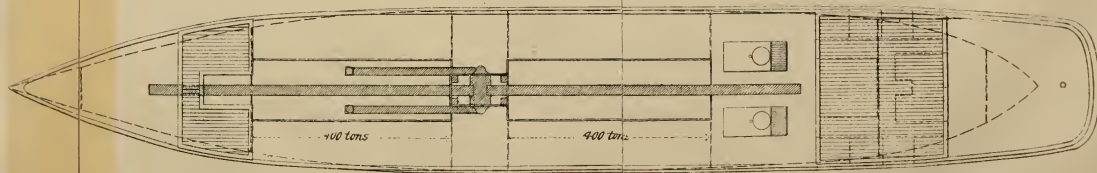
When bunker-holes are inaccessible to ends of coal-shoots, the delivery is directed in portable tubes or trolleys, and tipped at a convenient bunker-hole. These trolleys form part of the collier's gear, are made light, and readily lifted on board. The portable funnels before mentioned are also part of her gear. Thus the collier is adapted and fitted for coaling any ship.

Men-of-war can also use their collision mats rolled to form a fender. By these means, and with slight way on, the hawser from the collier to the ship being made fast on the inner bow of the former, in order to allow a stream of water to pass between the two, coaling at sea from a collier as described above would not be a very formidable operation, and in harbour would apparently meet all requirements.

A single apparatus can be applied easily to an ordinary collier, where the machinery can either be placed below by building a bulk-head, or on deck like an ordinary donkey engine. Supposing the vessel has two holds, one can be placed at each of them, and each apparatus can be made to discharge 100 tons an hour.

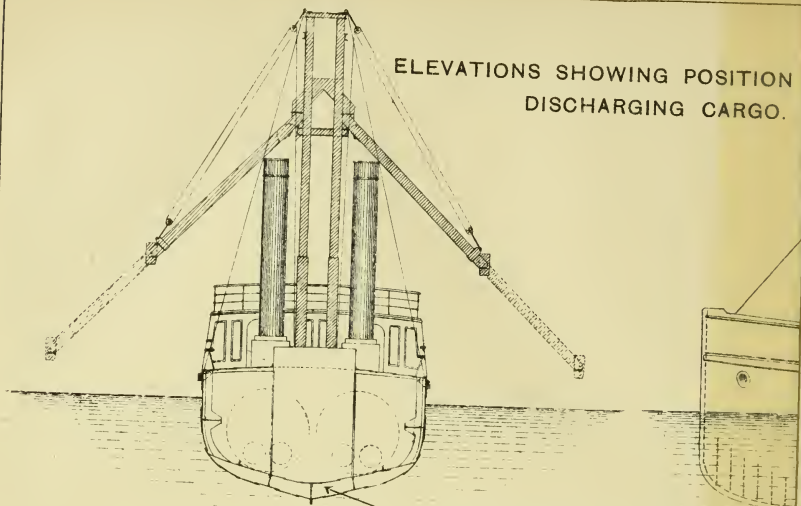


BLUE FOR COALING GEAR, SHOWN THUS. 



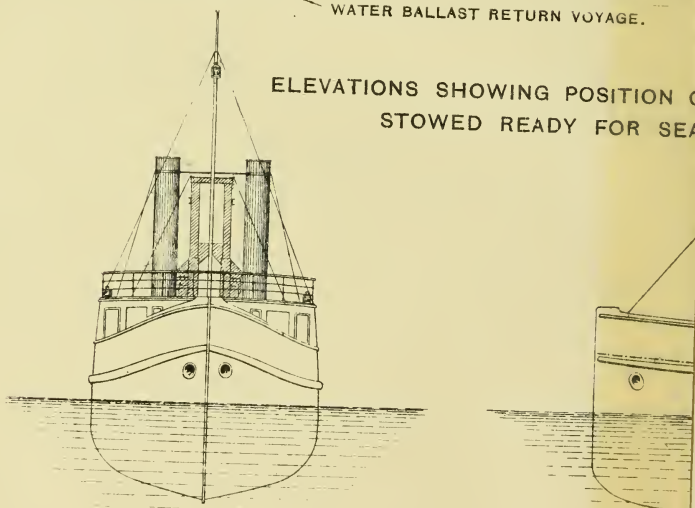
PLAN SHOWING SPACE OCCUPIED ON DECK BY COALING GEAR WHEN AT SEA.

ELEVATIONS SHOWING POSITION
DISCHARGING CARGO.



WATER BALLAST RETURN VOYAGE.

ELEVATIONS SHOWING POSITION OF
STOWED READY FOR SEA



800 TON COALING FLOAT.

BLUE FOR COALING GEAR, SHOWN THUS.....



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Mr. JAMES RIGG, C.E. : I should have preferred that some one else had been called upon before myself to take part in this discussion, and I will endeavour to be as brief as possible. My business is that of an engineer, and, in connection with this question of loading coal, I have been at work now more than twenty years. In the year 1882 the difficulty of coaling steamers was brought before me very prominently by a firm of shipowners in Liverpool, and I was led to take out a patent for a method of doing almost exactly what this steam collier is intended to accomplish. With regard to the drawings which are before us, I cannot help thinking that they are open to criticism, and that they are here for that purpose; and, among other matters which it seems to me may be criticized and condemned more particularly is the bucket, which I consider would be impracticable. Buckets are not suitable for loading coal, and that preferred in the Navy cannot be put into buckets at all, because it is South Wales coal, and is in far larger blocks than that obtained in Lancashire and the North. The coal to be dealt with would require trays and not buckets such as these. In my specification I have made a difference between *buckets*, which were a success for loading grain, and the *trays*, which we intended to use under similar circumstances to those now under discussion. I understand the booms travel along the coal. If they are not protected in their travel *from* the coal I do not think it possible satisfactorily to work the machinery which we are informed is placed amidships for raising and lowering the columns to which these booms are attached. There are other matters of detail which, I think, are open to criticism, but the object intended to be attained is a very admirable one, and I think, subject to these criticisms, this could be made perfectly practicable as a collier for coaling a man-of-war at sea. There are, however, other occasions when these, as well as other vessels, have to be coaled, and I venture to think they are as important, if not more so, than coaling at sea. There are coaling stations of three kinds. In the first place, those in which coal is loaded from railway trucks at a considerable elevation. Secondly, there are stations such as that of the Tanjong Pagar Dock Company at Singapore, where they take coal out in cargoes, stow it in sheds, and that coal is subsequently put on board the steamers by means of a large staff of coolies, the whole of the coal being carried on these men's shoulders. Thirdly, the most important description of coaling station is such as that of the Grand Canary Coaling Company, where the coal must be loaded out in the open, just as grain is also landed at Taganrog. These three cases have to be dealt with, and I think each of them is quite as important as the one which is the exact subject under consideration. As it is of interest I will just add, with regard to this patent of my own for a floating elevator, of which here are the drawings, that I found, on taking it out in 1882, that the cost of coaling, as compared with manual labour in Liverpool, would be as follows. The calculation from which I quote formed part of a descriptive article respecting my system which appeared in "Engineering" at that time:—

" Cost of Bunkering Coal with Patent Elevator.

	£	s.	d.	s.	d.
Engineer, per week.....	2	0	0		
Stoker	1	7	0		
Additional labour (two men).....	2	10	0		
	<hr/>				
	5	17	0		
Depreciation 10 per cent. on cost of elevator (2,500 <i>l.</i>) for one week.....	4	16	2		
Coal and stores per week (three working days)...	3	5	0		
Filling.—Eight men, each 7 tons per hour = 56 tons per hour or 560 tons in 10 hours (1 day) = 1,680 tons in 3 days at 1½ <i>d.</i> per ton.....	8	15	0		
Trimming 1,680 tons in bunkers at 2½ <i>d.</i>	17	10	0		
Royalty on 1,680 tons at 0½ <i>d.</i>	3	10	0		
	<hr/>				
	43	13	2	per ton.	
Present charge is 1,680 at 1 <i>s.</i> 6 <i>d.</i>	126	0	0	=	0 6¼
	<hr/>				
	82	6	10	=	0 11¾"

Now, the buckets must be filled by hand, and I venture to assert, without fear of contradiction, that it is utterly impossible to load coal in the manner shown by these buckets. It can never be taken up by such buckets, but must be put in by hand, and the price which is now being paid, or was then paid, was $1\frac{1}{4}d.$ a ton for that labour. The best gangs of coal stevedores were found to be capable of lifting, each man, seven tons of coal in sixty minutes; therefore, eight men, being a gang capable of working at these elevators, each lifting seven tons per hour, would result as shown in 1,680 tons being loaded in three days at $1\frac{1}{4}d.$, or *8l. 15s.* for this labour.

Captain FITZGERALD: How high will they lift it?

Mr. RIGG: Merely within a man's reach into the buckets. To this were added trimming and royalty, thus resulting in the cost shown of $6\frac{1}{4}d.$ per ton. The charge then being made by stevedores was *1s. 6d.*; therefore there was an economy of $11\frac{1}{4}d.$ by adopting this mechanical method of loading as distinguished from the system of loading by manual labour, if it may be called a system at all; so that there is a loss of *1s.* per ton on that account. I will not trouble you with more detail than this, because I feel my time ought properly to be limited, but I may mention that I have within the last six months completed, at the request of the President of *La Société Française des Houillères du Neveri*, the drawings and specifications for the machinery, and it is now being built in France, of an elevator which is to be erected at Venezuela for this precise purpose of coaling steamers, but steamers which can be brought alongside. There are about ten drawings here and twenty sheets of specifications in connection with it. The first drawing gives a side elevation of this portable elevator for loading into side bunkers on both sides of a steamer simultaneously.

The CHAIRMAN: I do not want to interrupt you, but I am a little struck by the fact that we must not get away from the discussion of this particular paper to another. Probably we shall be very glad to hear the details from you on a proper occasion, but your remarks are too far away, if I may say so.

Mr. RIGG: The question of side bunkers was raised as an incident in the paper. Here are side bunkers as shown in the sectional drawing provided by the French Transatlantic Mail Steamship Company. The whole of the work is done by one pair of winding engines and by one man, and the expense is found to be very much less than that of manual labour. I am perfectly satisfied that a mechanical method of loading coal will have to be adopted before long. I might add one word to what I said just now. A question has been raised as to whether the elevator described in the paper has been tried. I understand it has not; but with regard to this one of my own, I spent the summer of 1883 with it on the Black Sea. We loaded under test at the rate of about 160 tons per hour, and I employed with it only a pair of 7-inch steam-engines. I believe this is the largest quantity that has ever been turned over within that time. The elevator with its pontoons weighed about 70 tons.

Captain FITZGERALD: I do not propose to follow the last speaker through his explanation of his drawings: I would rather confine myself to the paper which has been read. I cannot believe, in the first place, that the continuous action which, if I understand it aright, is supposed to take place with these buckets, like an ordinary dredger, would work in the way supposed. I think something of the kind might be devised in which you could fill the buckets by hand. There would be very little manual labour in shovelling the coal down hill into the buckets and working the hoist intermittently, so to speak, elevating the coal, and getting it a good height, so that it will run down into the bunkers; but as to this continuous working with the closed shoots, when I hear that it has never been tried, I am very much inclined to look at it with considerable scepticism. I think the shoots would be almost certain to choke in a very short time, and those closed shoots choked would stop work altogether. I understand it is not intended to be used for coaling at sea. The last speaker alluded to that, but I should think any seaman who saw that arrangement coming alongside at sea would ask them to haul off, and would rather chance bags or any other method, because the whole thing is too gimcrack for use at sea. There is one point to be considered in this coaling question (of course the Officer who read this paper is considering a man-of-war, and not a merchant

ship, like the last speaker). We are considering the coaling of a man-of-war, but as a matter of fact the coal is put on the deck of a man-of-war faster than it is wanted in many cases. It is a question of stowage. Generally after the first hundred tons or two are on board there is no use shooting coal on the deck. In the modern ships there is no deck to shoot it on to as a rule. The writer says there is a great advantage in filling up frequently before too much coal is used. So there would be if you could get it in; but in the way our men-of-war are built now, in a great many cases you cannot get the coal in till about one-third of it is out. It does not run down your bunkers. You may burn 100 tons of coal, and you may say "coal ship," but you cannot *do* it. From the shape of the bunkers the coal won't go down; it does not run away from the top, therefore you cannot fill up constantly. Then there is another question. The writer suggests, "Why not make the bunkers of plain shape; wing bunkers round the engines and boilers, and plain boxes going right across the ship, before and abaft the boilers?" I should like to see what the naval architect has to say to that. The writer evidently does not remember that our coal is our armour in modern ships. They have taken away our armour, and we are to trust to the coal for protection, and so far from plain bunkers running across the ship, one of the principal things we are to trust to for armour to keep the ship from being sunk, or the engines being smashed, is coal stowed in all sorts of in and out complicated places. You have to deal with the fact that the bunkers are not as you would like them to be. As we hear that this ingenious machine has not been tried, I think we are justified in saying try it before asking us to accept it, and I am very much afraid it will be found to be utterly unpractical.

MR. JOHN COLLETT: I should like to make a few remarks on one point. The lecturer tells us that with two colliers for each dockyard, carrying about 1,000 tons of coal each, there would be a saving by his system of 5s. a ton on the present method of supply. It is not quite clear to my mind how that is arrived at, but the greater part of it is apparently obtained by deducting the cost of the coal at Portsmouth, estimated at 11s. 6d. a ton, from the alleged rate-book price. So far from any saving being effected, I am prepared to contend that the cost would be considerably more than at present. Descending to details, the cost quoted of Welsh coal at the pit's mouth, the freight to Portsmouth, and of discharging, may be taken as fairly accurate, assuming, as appears to be the case, that the data are those of about twelve months ago; but there is an error of addition, which makes the total 12s. 6d., and not 11s. 6d. per ton. One element, however, that of transhipment from the collier to the yard, is usually included in the freight, and may be taken in diminution. On the other hand, the cost of transfer of coal from the pit's mouth to the docks at Cardiff, which is, roughly speaking, about 1s. 6d. a ton, is omitted. The data given, corrected in the way I have suggested, will make the estimate 13s., not 11s. 6d., a ton. Again, the contract price, alleged to be derived from the rate-book, is taken at 15s. 2d. per ton; as a matter of fact, the average of rate book price was 12s. 3d. last year, the price at Portsmouth being even under 12s. I think that these facts show that the greater part of the alleged saving disappears at once. Certainly there would be a small saving in the number of coal bags used, and in wear and tear of the hulks, &c., but it would not amount to much. It is stated further that two colliers would be required at each port, or for the four principal ports alone, eight in all. To compare this system financially with the present system, you must employ these colliers continually, so as to bring the freight down to what you pay to the merchant colliers at present, assuming that the Admiralty colliers are worked as cheaply. But two colliers of 1,000 tons each, running continuously, taking the average voyage at 10 days, viz., 1½ day going, 1½ day coming back, 2 days loading, and 2 discharging, and a margin of 3 days for the run, which is a moderate allowance, would considerably more than meet the requirements of the whole of the yards. You therefore have too many colliers for ordinary purposes, and, on the other hand, you have too few for quick supply. When wanted—for in time of war or any other emergency what would be the use of two, or even eight, colliers?—you would want a large fleet of them, not only for supplying the home yards, but all the squadrons round the coast. It would be impossible, I consider, for the Admiralty, with any regard for economy, to keep always in reserve a huge fleet of colliers equipped in this manner. Supposing the mechanical plan

advocated were practicable, the only feasible way to give effect to it would be to subsidize colliers to keep the apparatus on board; but this would also mean a large annual expense. In conclusion, I must confess that I do not see, even if the price of coal under both plans be taken as the same, and I have shown that the actual price is less than that estimated, how you can escape a very much larger cost under Lieutenant Greet's plan than the present system involves.

Captain CHASE PARR, R.N.: The last speaker has shown that the expense of maintaining these colliers constantly in use would be considerable, and keeping that gear fitted would also lead to considerable expense; but I do not see why colliers should not be provided with simple whips and derricks in the same way the colliers at Sydney are fitted, which bring the coal round from Newcastle and put it on board the men-of-war in the harbour of Sydney over the upper works of the highest man-of-war at a very much quicker rate than it can possibly be stowed in the bunkers. Of course for the first couple of hours perhaps the run of coal is not as fast as it can be stowed in the bunkers, but after that for the last two or three hours the delay in the stowing is so great that a very much slower supply of coal is all that is needed, and I think for war-time all that would be needed would be that a certain number of colliers should be provided with this very simple whip and derrick apparatus, and that that would meet all the requirements of the case. These vessels ought not to be too large.

The CHAIRMAN (Admiral Colomb): It is usual for the Chairman to say a word or two before calling upon the lecturer to answer the criticisms that have been offered. I think, small though we are in number, the discussion has been distinctly useful, and a great deal of light has been thrown upon the question from one or two points of view. I understood the paper myself to be founded almost actually upon the experience of the last year's manœuvres—I took that from what is said at the beginning of the paper—and that the intention was to remove those difficulties and not to go further into the question. I do not know what was in the lecturer's mind, but the question during the manœuvres, as far as it came under my notice, was that either large colliers required some much more rapid means of discharge than they possessed, or else that the colliers supplying a fleet in that way must be small and numerous. With these large colliers there was great delay after being placed alongside one ship before they could get to the next, and the whole fleet could not be coaled till this process had been gone through with each ship in succession. I rather supposed, I do not know whether I am right or not, that this arrangement was entirely with a view of removing that difficulty, and I presumed the idea was that colliers employed by the Government would be fitted in some method of this kind. I am not competent to criticize the machinery, and to say whether it would answer its purpose or not. We have this advantage, that the gentleman who is reading the paper for the lecturer is a competent man, and the firm to which he belongs is a competent firm. I think Mr. Rigg's remarks have been in that way very useful too, and that it is a great advantage for us that engineering firms are turning their attention to this question, which every naval Officer knows is a very important one and wants to see solved in some way. The question before us to-day, as I understand it, has not been the sea part of the business, but the coaling in harbour, and especially the coaling of fleets in harbour under pressure of war and away from regular naval bases, making attacks upon the enemy's coast and that sort of thing; or blockading where you have not your home appliances ready, and where those appliances must appear in the ships attached to the fleet for the purpose of coaling them. I will now call upon the gentleman who read the paper to answer the criticisms which have been made upon it.

Mr. BAILLIE: With reference to the cost of coal, I took the average cost of Welsh coal and north country coal at Portsmouth and Plymouth, and I think on running it out, it came more exactly at 11s. 6½d. I could not be certain about the contract price being 15s. 2d.; they are Lieutenant Greet's figures. Mr. Collett would know the exact present contract price. As to the bunkers, I think ships are at the present time being built with cross bunkers and wing bunkers along the engines and boilers.

Captain FITZGERALD: Where?

Mr. BAILLIE: In the "Camperdown," at Portsmouth. There are also the water-

ballast chambers, which, with the cabin and ward rooms along the engine and boiler space, would be use for coal in war-time.

Captain FITZGERALD : Every bunker is divided into about twenty different compartments. All I meant to imply was that the modern ships' bunkers were unfortunately more complicated than the old ones which we have hitherto had to deal with.

Mr. BAILLIE : Of course we know that the stowage and trimming of coal takes the longest time, but if there were more men available for stowing the coal, which would be the case if the coal were put on board by machinery, the trimming and stowage would be done much quicker. With reference to machinery, I may mention that the size of the engines required to elevate the coal in the present design would be two 8-inch cylinders, 16-inch stroke. The weights of the different parts of the machinery above deck would be : cross head, hopper, wheels with bearings and shafts, 3 tons 5 cwt. ; the two booms with wheels at lower ends and rollers, 6 tons ; shoots and nozzles, 3 tons ; two sets of 40 buckets and chains, 4 tons 10 cwt. This makes a total weight of say, roughly, 17 tons. The four top columns weigh 4 tons. Working out the centre of gravity of the above, I found it was about 10 feet above deck when the whole apparatus is lowered ready for sea. The collier is designed to carry 800 tons of coal with a total displacement of 1,880 tons.

The CHAIRMAN : It only remains my pleasing duty to return your thanks to Lieutenant Greet, in his absence, for his paper, and also to Mr. Baillie for the able way in which he has read it.

Friday, February 8, 1889.

GENERAL SIR J. A. LINTORN SIMMONS, G.C.B., G.C.M.G., R.E.,
in the Chair.

THE VALUE OF ARTILLERY IN THE FIELD.

By Major-General C. H. OWEN, late R.A.

THE value of artillery in the field as a powerful instrument of destruction has been long recognized, at any rate since Napoleon, and his able artillery commanders Senarmont and Drouot, showed what better organization and increased mobility enabled them to accomplish with their guns at Friedland and in other battles.

During the long peace succeeding the Battle of Waterloo little attention was paid to artillery tactics, and in this country field artillery had been reduced to such a low point, that a few years before the Crimean War it would have been difficult to collect more than half a dozen batteries for any expedition abroad. It was only in 1848 that our troops of horse artillery were increased from two to four guns, and in 1852 both horse and field batteries were raised to six pieces, and the latter augmented to twenty batteries. This augmentation was obtained by Lord Hardinge, who had seen the great effect of artillery fire at Sobraon in 1846, and who acknowledged that "if the thirty-six heavy guns had not been brought to bear we should have been repulsed." The Russians maintained their belief in the power of artillery, and crushed the Poles at Warsaw in 1831 by the fire of a large mass of guns. They practised the same tactics on ourselves at Inkerman, bringing a mass of guns on our flank, the fire of which would doubtless have enabled their infantry to drive us from our position had they not been entangled in the ravines leading up to the heights.

The formidable power of artillery was demonstrated clearly in the Crimea, and after it very great interest was taken in all artillery matters, the fruits of which appeared in the use made by ourselves in India and China and by the French in Italy of artillery, and in the commencement of an unparalleled series of artillery experiments in this and other countries. It is true that the Prussians in the war of 1866 were much behind the other Powers in these respects, their field artillery, partly smooth-bored guns, struggled along at the rear of the other troops, they could not be brought up in sufficient numbers into action, and were not able to shoot when

there. The enormous improvements made after the war enabled it to render very great service to the other arms in 1870, and since that time there is a tendency to attribute every advance in artillery practice or tactics to Germany. Well, many of us have been told to copy the French, Germans, or others in military matters, but we are apt to forget that these have often copied ourselves, and learnt a good deal from our Schools of Instruction, our experiments, our military literature, and even from our small wars. Fortunately for us as a nation, but unfortunately for our *experience* as soldiers, our troops have never been engaged against European armies since the Crimean War, and neither Officers nor men, except a few of the former who served in the Crimea, have ever been under a heavy fire from artillery; this may account for the low estimate of field artillery now apparently held.

After all the instruction so lavishly given to British Officers of the present day, I was under the impression that the increased power of the guns now used would be recognized, and that the idea of the effect of artillery fire being chiefly moral had been exploded a good many years ago. I found, however, a short time since that I was mistaken. In an able lecture delivered at Aldershot last April by Colonel Lonsdale Hale (late R.E.), I was not a little surprised to hear him use these words: "As regards the man-killing power of artillery, I am, I know, one of a few, a very few, who believe in it;" and, when he goes on to say that this disbelief is in his opinion fraught with danger to the Army, I feel sure many of us will share his opinion. For this disbelief Colonel Hale gave the following reasons:—(1st.) That few Officers of infantry have not, in preparing for promotion examinations, imbibed their artillery ideas from Clerly's "Minor Tactics," which gives instances of artillery fire practically out of date. (2nd.) Impression produced by statistics of relative effects of infantry and artillery fire given in Colonel Home's "Précis of Tactics," and Lord Wolseley's "Soldier's Pocket Book," and other works on tactics, the artillery fire being credited with only 5 per cent. of the losses against 90 due to infantry fire. (3rd.) That many artillery Officers don't believe in the man-killing power of their own weapons; and (4th, perhaps the greatest) Lord Wolseley's opinion in his "Soldier's Pocket Book" that "the effect of artillery is more moral than actual; it kills but few." I think I may safely say—that the instruction to be derived respecting the use of artillery as an arm, from some of the works on tactics generally used, is of a very meagre kind.

As for the statistics of losses, I confess to have no faith in them. Colonel Brackenbury, R.A., in his able lecture at Aldershot in June last, on the "Use and Abuse of Field Artillery," gave a long table published in the *Revue Maritime et Coloniale*, and, as he said, it has been since used by many writers. It professes to give the respective losses caused by firearms and steel in the wars of '64, '66, and '70. But we should like to know how the numbers were obtained? Whether they included killed and wounded, or only the latter, as suggested by Major Walford, R.A., in the discussion after the lecture? There are some manifest absurdities; e.g., the Prussians suffered as much from

mitrailleuse as artillery (*i.e.*, 5 per cent.); this would hardly be admitted by them: it would also appear that they had no losses from the sabre. Does this table include losses in siege as well as field operations? If so, the figures are of little value, as there were no sieges in 1866.

The Prussians by their artillery caused, according to the table of losses, 10 per cent. of the Danish losses in 1864, only 3 per cent. of Austrian losses in 1866, but 25 per cent. of French losses in 1870, showing that the effect of their fire had declined and reached a very low ebb in 1866, but had improved greatly in 1870. So far it agrees generally with the accounts given by those who took part in these wars, but it rather looks as if the table had been made to square with the accounts. Prince Kraft, speaking of the losses suffered by the large mass of artillery, 210 guns, at Vionville (Mars-la-Tour), where it was constantly within range of energetic infantry fire, says: "I have no means of knowing how large a part of the enormous losses of this artillery, in that battle, was due to artillery, and how much to infantry fire." If the table had been compiled from accurate statistics, Prince Kraft would have had the means of knowing. But he goes on to say that, as it had alone to repulse many infantry attacks, the greater part of its loss was due probably to the Chassepot fire. He makes a guess from his experience at Saint Privat, where the batteries of the Artillery of the Guard, which lost 25 per cent. of the horses and 20 per cent. of the men present in the battle, attributed 75 per cent. of this loss to Chassepot bullets. This percentage does not agree with that in the table, which gives 88 as the percentage of losses caused by French infantry fire, and this was a case most favourable to it, for, "whilst these batteries were, from 2 P.M. until nearly 6 P.M., standing in position under fire in front of Saint Privat, three French battalions, all extended in skirmishing order, lay in their front at a range of from 900 to 1,000 paces, all their men being covered by the fences between the fields. A similar line lay 100 yards in rear, and a third farther back still. The foremost of these three lines fired without ceasing at the batteries." If we take a case favourable to artillery fire, as Sedan, we find military writers, both German and French, just after the war attribute the great losses of the French especially to artillery fire; and the correspondent of the "Daily News," riding over the field the day after the action said: "The ghastly wounds inflicted on most of the French dead whom I saw upon the hill showed that they had fallen under an artillery fire; and the ground was in many places so ploughed up that a blanket could scarcely have been laid on it without covering some spot where a shell had exploded."

If I have dwelt on this table of losses longer than may seem necessary, it is because, in the discussion on Colonel Brackenbury's lecture at Aldershot on the "Use and Abuse of Artillery," it was quoted by Lord Wolseley not only to disparage the diagram of effects of shell fire shown, but to prove that "the effect of artillery is more *moral* than *actual*." He says in his "Pocket Book" (p. 389, 8th Edition): "This should be constantly pressed on the minds of you

infantry soldiers;" and he quotes at p. 121 the instance of Gravelotte, where it was said 90 per cent. of killed and wounded were hit by bullets and only 6 per cent. by artillery fire. Supposing this to be correct, it may be pointed out that at this battle the Germans attacked in some instances in columns, that Bazaine held back a fine reserve of artillery, and that the French fired common shell or ineffective shrapnel. The reason for impressing the above so-called truth, on the infantry especially, comes out at p. 121, viz.:—to "put a stop to the cry for more guns which one still hears occasionally." I am afraid this cry for more guns, as well as men and horses, will be heard pretty loudly if we find ourselves at war with a Continental nation.

If we want to form a just estimate of what artillery did as an arm in recent Continental wars, it is better, instead of trusting to doubtful tables of losses, to examine carefully the reports and accounts of those who actually served in those wars, or wrote from sound information at the time. There are plenty of such sources of information respecting the war of 1870–71 in the official accounts, and in those of Hoffbauer, Boguslawski, Rüstow, Frossard, De Wimpffen, Nieman, and others; and fortunately, as far as artillery is concerned, the subject has been exhaustively treated by Prince Kraft zu Hohenlohe Ingelfingen in his "Letters on Artillery," a good translation of which, by Lieut.-Col. Walford, R.A., is to be found in the "Proceedings of the Royal Artillery Institution" of last year.¹ You are all probably aware that Prince Kraft is considered one of the ablest artillery Officers in Europe, as far as field artillery is concerned, having had ample experience in the commands of large numbers of batteries in the wars of 1866–70, and having exerted himself most energetically during peace-time to improve the German field artillery in all its branches,—organization, drill, tactics, and gunnery. The chief results to be gathered from these "Letters on Artillery" were put forward by Colonel Brackenbury in his lecture on the "Use and Abuse of Field Artillery" at Aldershot.

Well, in all these works we may find numerous instances of a way being opened for successful attacks by other arms, of infantry and cavalry attacks being stopped or repulsed, of buildings and other obstacles being broken through or destroyed, of field artillery or machine-guns being annihilated, silenced, or driven off by the fire of artillery, and it should be needless to say that moral effect could hardly have accomplished such things without a considerable amount also of destructive effect. Although the Sepoys in the Indian Mutiny were, as Lord Wolseley said at Aldershot, inspired with confidence by hearing their own guns fire blank cartridge, I confess I don't think French, German, or our own troops would be satisfied or terrified by mere noise. The first time I was under a heavy fire from artillery a round shot came shrieking along, knocked the leader of the team of an ammunition wagon off his legs, rattled through the belly of a wheeler, and dashed on as if it had done nothing; the moral effect was certainly

¹ All quotations from Prince Kraft's letters are from this translation.

very great, and I had difficulty in getting the men to disentangle the team; it was not, however, produced by the noise but by the ghastly damage done. Those who have seen service in warfare where artillery has been employed, will, no doubt, acknowledge the great moral effect produced by its fire; and, as Colonel Brackenbury pointed out at Aldershot—"It is not the number of the enemy killed and wounded which ensures victory, but the moral effect produced on the remainder." I and a good many others think artillery may claim to inflict, beyond mere moral effect, a great deal of actual damage to men, horses, and matériel, if it be properly trained and handled well in action, but the latter is impossible if its power be not acknowledged.

To judge what can be done at the present time by artillery in the field, we must take into account the improvements made during recent years in guns and ammunition, and, what are of equal importance, the pains taken to train and instruct both Officers and men in marching, tactics, and gunnery; so that in future we shall have to deal, if engaged in a Continental war, with more formidable artilleries than that of the Germans which produced such great results in 1870. Colonel Brackenbury exhibited instructive diagrams, showing the number of hits on targets at different ranges made by the shrapnel shell and case shot now used. The latter struck me especially as being far more numerous than I should have expected. These diagrams were said to have produced quite a nightmare at Aldershot, so I have refrained from borrowing them for this afternoon. It is true that the table of losses appeared to reassure some of the speakers, but I think I have shown it is not very trustworthy, and in any case would hardly apply to the future.

In the war of 1866 the German artillery were badly handled and could not shoot, and in 1870, although it was well handled and shot with precision, it fired but very few shrapnel shell, and had, I think, no time-fuzes; while the French fired a good number of shrapnel, but with fuzes only adapted to a few ranges, and could not therefore be effective. I think but scant justice has been done of late to General Boxer, R.A., who made so many improvements in the shell and fuzes, and I do not hesitate to say that had British artillery taken part in these wars, the enemy would have been considerably astonished by our shrapnel fire, and would have suffered much from it. At that time only ourselves and the Austrians put the bursting charge at the base of the shell. I myself fired spherical shrapnel shell with terrible effect over the heads of our assaulting troops, at the left flank of the Redan, 35 years ago, and our field batteries used shrapnel in the Crimean war; and during the Mutiny in India we fired shrapnel at Lucknow with the fuze inwards to act as case, a similar method to that (setting the fuze at zero) recommended by Prince Kraft now, and which has long been understood in our Service.

The rifled guns first introduced, and those used for many years after, were fired with small charges compared to those of the old smooth-bored guns; and even in 1866, many of the German Officers, who were then much behindhand in artillery matters, contended that

there should always be, as they had at that time, a certain proportion of smooth-bored field guns, for shrapnel and case, owing to the low velocity given by the small charge of their rifled guns, which were not effective.

Now, in consequence of the large charges and better adaptation of the powder and dimensions of the bore, very high velocity is given to the shells, and this has immensely increased the power of shrapnel shell fire. These shells can be fired with destructive effect at much longer ranges and at lower angles of elevation, so that more ground is rendered dangerous by the bullets after the shell bursts; and I am told that they can break through shelter-trenches, buildings, and obstacles of small strength, and still be effective inside of them, even with percussion fuzes, which would have been useless with the shrapnel from the older guns. We thus see that there has been, during recent years, the development of a more destructive fire from artillery. There would be a disadvantage in the high velocity if firing from below at troops or guns posted just behind a ridge, and in some other cases, and there might be premature bursting, a serious thing if firing over the heads of our own troops; but I understand that with the steel shrapnel now made it does not occur; on the contrary, the shell does not break on explosion, which is a disadvantage. I stated this objection of premature bursting some years ago in the discussion after an able lecture in this room by Major-General H. Brackenbury. There is also another disadvantage resulting from very high velocities, viz., greater difficulty in regulating fuzes, the intervals of time corresponding with differences in ranges being so much less than with the lower velocities. The bursting charge is placed in the head of this shell, to give room for a few more bullets; but this is against the principle of the shrapnel, and must cause retardation of the bullets.

In an attack on an entrenched position, or in firing at guns or troops posted or moving in ground pretty well sheltered from shrapnel fire, or at artillery either in the open or in gun-pits, common shell will have to be used. Remember that the effect of a common shell on explosion acts all round, while that of a shrapnel lies mainly in a forward direction. The force from the explosion of a common shell is capable of dismounting guns and destroying carriages, while the flame explodes ammunition boxes, and sets fire to combustible objects. And I can assure you from experience that the explosions of shells, dropping over cover and bursting, so as to hit those apparently under secure shelter, have a demoralizing effect not to be despised. This is especially so with vertical fire; I am not going to propose mortars for field service, but I have long thought that a few batteries of rifled howitzers, firing shells with large bursting charges, would be often valuable in the field, especially for attacks on entrenched positions; for being fired with smaller charges and at higher angles than shrapnel shell, they could reach objects quite secure from the latter. I cannot see the object of firing common shell with very high velocities in the field, the effect on men and horses under cover, or on guns, wagons, ordinary buildings, &c., being thereby diminished. I

should think it very doubtful whether tough steel is a good material for common or other shells. Then the effect of shells can be increased by having bursting charges of *mélinite* or other more powerful explosive substances than gunpowder. I am told by the best authority in this country that the application of high explosives in shells is being rapidly and successfully developed; this will be a means of greatly increasing the power of artillery.

It is sometimes objected that common shells are liable to bury themselves harmlessly in the ground, with or without bursting, as many did in the actions during the war of 1866; but that many of the Prussian shells were blind is not very surprising, for Prince Kraft says: "I could also name to you some large bodies of artillery whose shells were blind, simply because, in the projectiles furnished at the renewal of their ammunition from the columns, they had forgotten, as was afterwards discovered, to insert any percussion arrangement." And he adds, "it is difficult to see how the shells could have been expected to burst." Fuzes are sometimes said to be defective when the fault has arisen from irregularity in boring or setting them.

It will be of little use to have powerful guns if Officers and men are not thoroughly trained in gunnery, so as to employ them in the most efficient way. An artillery that goes into the field at the present time, without the requisite gunnery training, will be very soon knocked to pieces by an opponent who has acquired the art of shooting, notwithstanding any superiority in armament the former may possess. Although Prince Kraft may now teach us a great deal, founded on his unrivalled experience in the command of artillery in war, there is little doubt but that he and other Officers of the Prussian artillery, who effected such a transformation in their systems of both gunnery and tactics between the wars of 1866 and 1870, learnt a good deal from us. Long after the establishment of our School of Gunnery at Shoeburyness,¹ the development of the artillery course at the Royal Military Academy, Woolwich (in which I had some share), and the foundation of the Royal Artillery Institution, and of this Institution, for distributing throughout the Service artillery literature of the most valuable kind—the Prussian artillery was in the most benighted condition. Independently of taking their tactics from the war-time of 1815, their School of Gunnery was not formed on an adequate basis till after the war of 1866 had shown such lamentable deficiencies in shooting; and then, as Prince Kraft tells us, "a singular fate was reserved for the scientific arm. It had to accept the principles of the unscientific infantry, the rifled firearm, and the breech-loader, and also their method of theoretical instruction," and "that a number of instructors had first to be taught," and that "the year 1867 was nearly over before a sufficient number of instructors had been provided to teach the troops a rational manner of shooting."

Notwithstanding the valuable results accomplished by our School of Gunnery at Shoeburyness, it has two disadvantages. One, that it

¹ 1859.

is combined with the Experimental Department; this is an advantage itself in some ways, as the courses and batteries trained there can acquire some acquaintance with the new matériel introduced from time to time; but, on the other hand, one department must interfere more or less with the other as regards convenience of practice, and I have often noticed it when there in command of cadets or field batteries. The second disadvantage is that a flat range over sands is a very imperfect one for field artillery practice, as it does not represent the conditions of service. But the Government took the wise step, in 1877, of forming annual practice camps at Hay and Okehampton, where field batteries can be trained on ground such as would be met with in actual warfare; in these they can be taught to fire at dummy troops or guns, on different kinds of ground, at varying levels, in the open, or protected by shelter-trenches, gun-pits, parapets of earthworks, or behind folds in the surface.

Careful instructions are laid down for the practice of horse and field artillery at these practice camps, and four descriptions of practice are carried on, viz., elementary, competitive, battery service, and brigade service. The two latter are conducted, as far as possible, under service conditions, and as they are at unknown distances, a method of finding the range, called *ranging* a battery or brigade, is adopted, consisting in three processes: (*a*) finding the long bracket, (*b*) finding the short bracket, and (*c*) verifying the range; the bracket being the distance between the ranges of two shells, one under and one over the object. Our batteries are provided with range-finders, and have observing parties which, by signalling, can show the effect of the fire; and to test the supply of ammunition from the wagons, the full number of rounds to be fired is not carried in the limbers.

The Germans lay much stress on practice at moving targets, not merely crossing the front at right angles, but obliquely, and advancing towards the battery, and selecting some point of ground over which the target must pass, and laying the guns on it; as we should do in firing from a coast battery on a vessel in motion attacking or passing it. They do not appear to attach so much importance to ranger-finders in the field as we do, trusting to the burstings of common shells. These methods of firing at targets moving in different directions are laid down in our Field Artillery Drill Book and in the instructions for our practice camps, and are carried out there by the batteries.

Hitherto four horse or field artillery batteries practised annually at Hay, and nine batteries in three divisions at Okehampton; but as Hay is unsuitable for 12-pr. B.L. or 13-pr. M.L. guns, thirteen batteries will go to Okehampton this year.

It only remains to take full advantage of these practice camps. It is said that the shooting season might be lengthened by adding a month at the beginning and another at the end; that more batteries might be sent at one time; and that they might be kept more continuously at work while there. These would involve increased expenditure of ammunition, and the steel shrapnel shell are each costly, but much of the practice can be carried on with the ordinary

cast-iron shells. Elementary practice in loading, laying, and firing a gun at targets at known or unknown distances can be done on any ordinary range like that at Shoeburyness. These machine-guns and magazine rifles should be tried against artillery, and for this purpose some infantry might be sent down to Okehampton. There is said to be little practice at unseen objects, and not a sufficient variety in the works fired at.

We hear a great deal now about quick-firing guns, and they are doubtless formidable weapons in fortresses, coast batteries, and ships, but I cannot see how they could be used to any extent in the field, as they require to be fired continuously from the same position without recoil. I have often thought that our field carriages might be improved by having recoil slides or some arrangement for lessening recoil. If the recoil could be prevented, both accuracy and rapidity of fire would be increased, the labour of running up would be avoided, and guns could be placed, as Captain Stone has pointed out, in positions otherwise impracticable.

The non-recoil carriages now made by Nordenfelt, Armstrong, and other companies are a great advance as far as they go; but although the compressors and breaks stop the running back, they do not prevent motion sufficient to throw out the laying to some extent, and the strain on the carriage puts a limit to the calibre of gun that can be fired from them. A 6-pr. is the gun recommended for horse artillery, but the shells of such a piece would be insignificant compared to those of the 12-pr. service guns. They might, as their advocates say, fire a greater weight of metal in a given time, but I think this is a fallacious comparison; and great care would have to be exercised to prevent quick firing being indulged in too often, or for too long a time, with consequent running out of ammunition. No doubt quick-firing guns are admirably adapted to some purposes for which horse artillery are employed—advanced guards, retreats, surprises, &c.; but horse artillery are often wanted to join the line of a mass of guns, and to oppose powerful field-pieces. Quick-firing guns have the great advantage of requiring so few men to work them, and being free to move in any direction, of giving great facility for following objects in motion.

Then with respect to the Maxim, the latest development of the machine-gun, we heard that Mr. Maxim, in reply to Lord Wolseley's remark, "If you can invent a machine-gun which will pump lead on troops or guns at a distance of 3,000 yards you will create a new departure in all the military tactics in the world," said, "that he had done it;" and, further, "that I will not only pump lead 3,000 yards, but also 4,000 yards, with great facility." It may, however, be suggested, that artillery might be able to return this storm of lead with the addition of a certain amount of iron, explosion of shells, and fragments, that might serve to knock the Maxim machine-guns about, damage their action, and dismount them; also that infantry or cavalry would not be inclined to remain quietly exposed to such a storm as a target for the Maxim gun. I am quite ready to allow that the Maxim gun is a very formidable weapon when used against any troops at

comparatively short ranges, if they are in pretty close formations and in confined situations, but at long ranges the effect cannot be observed, and their fire is of little use against matériel, whereas if struck by shell they are very liable to be disabled.

Of the effect produced by the rifled field artillery of the French in the war of 1859, or of that by the breech-loading small-arms of the Prussians in 1866, there was no doubt; but it can hardly be said that the war of 1870 was much influenced by the French mitrailleuses, although they at times caused a great deal of destruction. In my work on "Modern Artillery, 1873," I gave a number of instances, collected at the time, of the employment of mitrailleuses in action. One was as follows:—At Gravelotte, a mass of German batteries (84 guns) came into action against a somewhat similar number of French guns and a battery of mitrailleuses. "As the batteries galloped up, vast numbers of French shells burst short in the air, or on the ground in rear, but struck nobody; a continuous rain of mitrailleuse bullets also fell into a particular hollow behind them where nothing was; but the German commander of the first three batteries in action directed their whole fire to be given together on the first French mitrailleuse on the right; thereupon, a confused storm of explosions was seen to spring all over where the mitrailleuse had stood, succeeded only by a vacant space with some wreck on the ground; the same treatment was adopted with the second and third mitrailleuses, on which the fourth vanished of its own accord."¹ The rapid destruction of the machine battery was not confirmed by Froissard, but he admits that it lost a great many men and horses, and had to be withdrawn with the aid of the French infantry supporting it, and it is evident that its fire did no harm. On the other hand, some mitrailleuses held their ground against artillery and repulsed infantry, but they were behind epaulments on the heights of Villette.

It may be said that the Maxim gun is a great improvement on the French mitrailleuse then used, but small-arms and field-guns have been also greatly improved since 1870.

In the discussion after Captain Stone's lecture at Aldershot, Major Hutton stated, that although the Nordenfelt gun made excellent practice on a level range, their effect was small at ranges of 1,450 and 1,120 yards when fired on ground under service conditions, the distances being accurately found with a range-finder; this was attributed to the wheels of the carriage not being level, but the firing party thought they had done considerable execution. This ignorance of what you are doing is a great objection. Then Major Meham stated that the smoke was so dense that the target was hidden, but this difficulty might be obviated by using smokeless powder; he also stated, that at 400 or 500 and 1,100 yards the rifles of infantry made much better practice than the machine-gun.

Major Hutton also gave an instance from the war in Egypt, where the machine-guns had to stop firing, as they dropped their bullets among their own infantry, over whose heads they were firing, although

¹ Taken from "Observations amongst German Armies during 1870," by Colonel H. A. Smyth, R.A.

the ranges could be easily calculated by telegraph poles. I agree with what Mr. Nordenfelt said, that "the rifle calibre gun will not take the place of the shell-firing gun."

A few machine-guns might be useful with the infantry escort for artillery, in keeping down infantry fire upon the guns, and resisting any sudden rush upon them. Some infantry Officers say that machine-guns attached to infantry rather tend to impede them, as infantry can move over ground impracticable to carriages; but organized in small batteries, as suggested by Captain Stone, they might greatly assist infantry or cavalry in close action.

We now come to the ranges at which guns should be fired in the field. In the first edition of my work, "Modern Artillery," published in 1870, I put them at from 1,000 to 2,500 yards, and for position guns some hundreds of yards further, always insisting that the longest *effective* ranges should be chosen when practicable; and, as these agreed with those laid down by Prince Kraft in a pamphlet he wrote shortly after the war of 1870, entitled "The Employment of Field Artillery," I kept to them in the edition of 1873. I added that in some cases when guns were attacked by infantry or cavalry, or if they could be brought suddenly on the flanks of an enemy's troops, very short ranges might have still to be used, but that breech-loading small-arms and machine-guns should render ranges under 1,000 yards very dangerous to artillery. Now that field-guns give such high velocities to their shells, greater *effective* ranges can be employed, and we may, I think, accept with confidence those given by Prince Kraft. He says: "The effect of artillery is noticeable at 5,500 yards. The effect of shrapnel begins at about 3,800 yards, and at from 2,000 to 1,500 yards is decisive, while at from 1,100 to 1,000 yards and under the effect of artillery is absolutely annihilating: always provided that its field of fire be open. Since shrapnel with the time-fuze set to zero have become so murderous in their results, the effect of artillery at very short ranges, which had been diminished by the former inferiority of the case for rifled guns, has now again become annihilating." I don't know whether he means to imply that case shot should be abolished, but I do not think it would be wise to do so. I don't think shrapnel with fuzes set to zero are very effective at ranges under 300 yards. I am no advocate of very long ranges, which are apt to lead to waste of ammunition; and time-fuzes are not adapted to over 3,200 yards range.

We must, however, always remember that the effect of artillery fire, like that of other firearms, is influenced by many circumstances in actual warfare, and not expect the same results as can be obtained on a practice ground. Battles are not generally fought on level plains in fine calm weather with no smoke, dust, or noise, or the issue might be like that of the combat between Kilkenny cats. Battles are often fought in foggy or rainy weather, when field-glasses are of small use, and when objects cannot be seen at long ranges. Both at Inkerman and Sedan the engagement began in a fog. At the former the projectiles of the Russians came crashing into our 2nd Division camp almost as soon as the pickets were engaged, the enemy knowing the

range; and at the latter, the Prussian guns could not at first open fire. Then high wind and heavy rain both tend to disconcert accurate practice. The next hindrances to accurate fire are the clouds of smoke and dust often hanging about, from the firing of guns and small-arms, the bursting of shells, and the movements of troops. Also the horrid noises caused by these, and the frightful gaps made in bodies of men and horses, the destruction of guns and carriages, and the blowing up of limbers and ammunition wagons, are enough to shake the nerves of the bravest troops, and make their shooting more or less unsteady. Besides these, the guns are not, as in sieges, fired from platforms, and must be run up after each round, often on soft or rough ground. Those who think that the effect of artillery fire is chiefly moral should remember that the fire of small-arms in battles is not always what might be expected from practice at a School of Musketry, and I think Lord Wolseley himself remarked on the inferior shooting of the infantry in the Egyptian War.

Lord Wolseley has recently called attention to circumstances that may greatly modify the tactics required in future wars, but I think some of them are scarcely ripe for consideration, at least at present. He says: "One remarkable change will be the absence of nearly all that terrific noise which the discharge of 500 or 600 field-guns and the roar of musketry caused in all great battles. We shall have practically no smoke to mark the position of the enemy's batteries and troops in action. The sound of cannon will be slight, and will no longer indicate to distant troops where their comrades are engaged, or the point upon which they should consequently march. Our sentries and advanced posts can no longer alarm the main body upon the approach of the enemy by the discharge of their rifles." I don't think we have yet reached the time when there will be an absence of smoke in warfare. Powder giving off little smoke is used for sporting purposes, and the French, ourselves, and others are working to perfect a smokeless powder, the explosion of which causes less noise than that of ordinary gunpowder, and if it can be used with success, some modifications in tactics may be necessary; but whether such powder can be made for ordnance is questionable. I wrote to Sir F. Abel on this point, and from his official position he could only send me the following guarded reply, but it is sufficient for my purpose: "Comparatively smokeless powders are likely to come into extensive use for small-arms within a brief period; such powders do produce considerably less noise than black powder. It would at present be premature to hazard an opinion as to the extent to which powders of that description are likely to displace gunpowder of the present types in artillery."

That artillery will certainly not use smokeless powder for shells must be evident, for the smoke from the bursting of the shell is an admirable guide to range and effect, and the noise of the explosion only affects the enemy, and is therefore an advantage, although it is but a moral one. As to other noises in action, there will always be the *pings* of the bullets, and the horrid screamings of the shells as they pass through the air.

With respect to field artillery drills it is pretty generally admitted that they may be simplified with advantage. I had the command of from two to six batteries for some years, and never attempted, nor asked other Officers to attempt, some complicated manœuvres that would not be required in the field. Prince Kraft says on this point: "Judging by my experiences in war, and you will own that in matters connected with artillery they are fairly numerous, the only movements which are of use in the field are, the advance in column of route, deployments, and the advance in line." I think you might add some others, such as change of front and methods of retiring. With what he says of the uselessness of galloping over short distances we should most of us, I think, agree, increases of a few hundred yards range being easily obtained with our present guns without moving. What is chiefly wanted, as he points out, is mobility over long distances in getting to the front on the march. He says: "It is no longer, as it used to be, desirable to gain a few seconds, in order to fire the first shot quickly; on the contrary, a long time is now taken over the first shots, in order to lay and observe them quietly and accurately. It is now a matter of hours, which we must endeavour to gain in coming into action." He writes: "The introduction of rifled guns, and the experience which was obtained in 1866, considerably altered the demands which must be made on the mobility of the artillery. The necessity of employing the great artillery masses early at the beginning of the fight demands quickness of movement, not over distances of 200, or at most 1,500, paces, but over distances measured by miles and days' marching." He mentions an instance when he had to trot 14 English miles in order to come into action, in 1866, but he adds: "Even greater demands than these must be made upon the artillery when it is a question of moving artillery from one flank of the theatre of war to the other, or of sending them quickly to bodies of troops which have been detached to a distance." "For example, the 1st Horse Artillery battery of the Guard marched, on 13th August (1870), 32 English miles from Bermering by Aron to Dieulouard, where it encamped on the same evening."

It is satisfactory to find that the practice of making long marches at a quick pace is not neglected in our Service. In December, 1887, Major Turnbull's battery of horse artillery marched in India 47 miles in 9 hours and 40 minutes, exclusive of two halts of 1 hour and $1\frac{1}{2}$ hours, and three or four short halts. The first 2 miles was across country, the rest over a metalled road up and down hill. In order to make these long marches, horses must be in good hard condition, not merely fat and sleek, as is sometimes thought requisite for our inspections. Lord Wolseley's criticism on the burnishing of "everlasting bright chains" may be just or not, but it is evident that harness must be cleaned properly or it will not last, and may gall the horses.

The importance of coming into action early and quickly cannot be overrated, for batteries in action have a great advantage over those coming into action, and infantry will seldom dare to attack in front a line of batteries in action. The Germans hold strongly that artillery in action cannot be driven back by infantry. Prince Kraft says:

"There were hundreds and thousands of cases in the war of 1870-71 where artillery which refused to retire could not be driven back by infantry fire;" and, "I repeat once more, and I cannot too often repeat, *artillery cannot, speaking generally, ever be driven back by infantry if it refuses to leave its ground.* On the contrary, when infantry fire is really hot, it cannot for the moment fall back, since so many of its horses will then be shot. But, nevertheless, nothing is lost so long as there are a couple of men left with each gun, who can load and lay quietly; it can thus go on doing its work until the last gunner is disabled." He warns us, as Colonel Brackenbury pointed out, against the errors that grow up in a long peace, and the terrible harm which umpires do at peace manœuvres by ordering guns back when under the fire of infantry.

The following instance is instructive as showing how artillery fire should be directed against advancing infantry. Prince Kraft says: "Standing behind the Captain of a battery in action, as troops were advancing to attack him, I heard him quietly give the order: 'Against infantry in front, 1,900 paces from the right flank. Ready. Fire one gun.' Then he waited, holding his field-glass to his eye, until the enemy approached the point on which the guns were laid, and gave the order: 'Rapid firing from the right flank.' Then there was a hellish sight, for the advancing enemy disappeared from view in the clouds of smoke which the shells threw up as they burst and tore their way through his ranks. After one or two minutes, the attacking enemy came out on our side of the smoke. It had passed the point on which the guns were laid, and, in spite of terrible loss, approached with undeniable bravery. Then the Captain gave the command: 'Cease firing! 1,600 paces—one gun!—cease firing!' and when the enemy drew near to the new point on which the guns were now laid, he cried: 'At 1,600 paces—from the right flank, rapid firing!' The effect was brilliant, horrible, and overwhelming. No attack could have resisted it."

It seems to me that, although artillery may in most cases be able to defend its front, it does not follow that infantry cannot attack it successfully under various circumstances. Its position may be turned and infantry succeed in getting on its flank at a few hundred yards range; and after the first furious artillery duel many batteries will be more or less disabled, and perhaps out of ammunition, when they might fall a prey to an infantry or cavalry attack well executed; hence the necessity of always providing a strong escort on exposed flanks of a line of guns, and putting horse artillery on such flanks. At first when guns are firing at long ranges there will be no danger from other arms, but battles cannot be decided at several thousand yards distance; troops must come to close quarters, the batteries may have to advance and may get entangled with other troops, or at any rate have their fire impeded by them, and opportunities may arise which may give an enterprising enemy a chance of taking artillery at a disadvantage.

Prince Kraft gives an instance from the Battle of Königerätz: "Thanks to the impetuosity and the rapidity with which our infantry

rushed to the front, the numerical superiority of the enemy's artillery could not, for want of time, produce at this phase of the struggle such a tremendous effect as it did at other points and at other moments in the course of the battle. It was, no doubt, on account of the very high corn, and of the smoke produced by the rapid fire which it kept up on our batteries, that the Austrian artillery were not able to follow with the requisite attention the advance of our foremost lines of skirmishers. It was these lines which, suddenly and at almost point blank range, overwhelmed the enemy's guns with a rapid fire, and captured 68 guns of this long artillery line (the 1st Division of the Guard took 55 and the 2nd Battalion of the 50th Regiment 13 guns). The others succeeded in escaping." The Prussian guns were just opening fire, and seeing some Austrian limber boxes explode and their line of guns cease firing, Prince Kraft and others thought their artillery fire had produced this result; but the explosions were due to the explosive bullets of the Prussian infantry. Hoffbauer gives an instance from the Battle of Mars-la-Tour of infantry inflicting considerable damage on artillery at a long range. He says: "From the moment of passing the defile which runs from Flavigny towards the south-west, the 1st Horse Artillery battery suffered severely from hostile infantry behind a hedge 1,500 paces distant." This case of infantry under cover and undisturbed quietly potting at a battery on the move is no indication of the proper range for infantry to engage artillery in action.

If it is of importance to come into action quickly, artillery serving merely as a target while doing so, it is necessary that when in action the fire should be deliberate at first while picking up the range, but when this is found the fire may be rapid, the effect, however, always being carefully noted, and any necessary alterations made in laying the guns and regulating the fuzes. There should be no salvoes except at close quarters, or random shooting of any kind. In firing on artillery several guns should be concentrated on one of the enemy's pieces until it is silenced, when the same fire should be turned on another.

The old rule was to fire common shell to damage or dismount guns and carriages, and to blow up limbers and wagons; and shrapnel shell to kill or wound men and horses, and I see no reason why it should not still apply. Now that shrapnel shell can be fired with percussion fuzes, which was not formerly attempted, they can also damage matériel and might blow up ammunition boxes, but common shell would be more effective for such purposes, and are less costly than shrapnel; and Capt. St. J. Ord, R.A., who has been Staff Officer at Okehampton for three years, tells me he does not consider percussion shrapnel suitable for firing against artillery, the intervals being too great and the bullets not having a very wide dispersion. He says respecting fire at artillery: "(1.) If your enemy's battery is in action in the open but no limbers or wagons visible, *i.e.*, just on the crest of a hill or a little way down the forward slope of it, then the proportion should be $\frac{2}{3}$ common to $\frac{1}{3}$ shrapnel, that is to say, out of every 6 rounds 4 should be common and 2 shrapnel, the great object being to

dismount or damage the enemy's guns. (2.) Supposing the enemy's battery is in action with its limbers and horses visible, then after finding the range¹ I consider the right proportion to be $\frac{1}{3}$ common and $\frac{2}{3}$ shrapnel, *i.e.*, 2 common to 4 shrapnel in each 6 rounds. The shrapnel should do much damage to the horses, always a very large target, and, with the very accurate sights (Scott's) now in the Service, there is great likelihood of the guns being damaged also." When the enemy's artillery is protected by natural or artificial cover, common shell must be used. Shrapnel shell is obviously the best projectile to use against infantry or cavalry when exposed or only protected by slight obstacles; but against troops protected by the nature of the ground or substantial cover common shell should be employed, as also against buildings or obstacles of solid construction.

One of the most important questions affecting the value of artillery in the field is that of the supply and renewal of ammunition, the arrangements for which should not only be thoroughly considered and laid down, but practised when possible in peace-time.

Breech-loading rifled guns can be more quickly fired than the old M.L. smooth-bore pieces, and when masses of artillery are pushed early into action, a very large number of rounds will generally be fired. It is an established principle in the German Service that "the ammunition in the wagons should first be used and that in the limbers kept as a last reserve;" and Prince Kraft tells us that, in 1870,—“so long as the permissible slowness of the fire rendered it possible to do so, every shell was to be taken direct from the wagon, with which object a wagon was posted in rear of No. 2 and another in rear of No. 5.”

Ammunition was allowed to be taken from the gun limbers only in two cases; to fire the first shot in a new position before the wagons had come up, and when a rapid fire was ordered. But as soon as the critical moment had passed, the limbers were as quickly as possible filled up from the wagons." And he says: "I found in the battles of St. Privat and Sedan, when I rode along the line of batteries and looked into the limber boxes they were full. And when at St. Privat we accompanied the infantry to the assault, the batteries reached the heights which had been captured between St. Privat and Amanvillers, and also the closer position near to St. Privat, *with full limber boxes.*"

He appears to advocate posting the wagons in the same line as the guns if there be sufficient space, and contends that they will suffer less if so placed than if they were 300 or 400 paces in rear; for he says: "In these days of rifled guns the space of 300 or 400 paces in rear of the battery is more dangerous than a position near to the battery and in a line with it, owing to the splinters of the shells which spread about it in all directions. The enemy's rifled guns shoot so well that their shells do not go sufficiently wide of the mark to hit the wagons. For the enemy does not lay on the wagons, but on the guns, which are firing at him," and to prove this he points out that—"during the whole of the Battle of St. Privat no wagon was blown up, but only some limbers." I am not quite satisfied on this

¹ Which would be done by means of common shell.

point; I think an enemy would fire at wagons as well as guns, and try to blow them up, as guns are not of much use without ammunition, to say nothing of the moral effect and probable killing or wounding of gunners, drivers, and horses by the explosion.

The supply of ammunition in action being so important, the wagons should follow the guns as closely as practicable, and the 2nd line of wagons should be within reach. Prince Kraft, citing a case from the war of 1866, in which some batteries were separated from their wagons, and the latter did not come up till the action was over, remarks: "But I learnt one lesson by this: *never again to allow the batteries to be separated from all their wagons.*" He goes into detail respecting the renewal of ammunition in the lines of wagons from the columns, and field depôts, but similar arrangements have been laid down for our Service. In peace manœuvres the wagons, under the Captain of the battery, should follow the guns, this Officer selecting good positions for them as regards supply and shelter; unfortunately, at the present time many of our batteries have no wagons.

I pointed out in 1873 that just before the war of 1870 some military critics adopted, from Chalons I think, peculiar ideas as to the employment of field artillery, one of their axioms being—"Concentrate your fire but not your guns," but after the war they appeared to be under the impression that the Prussians had discovered new tactics in massing their guns. Artillery masses had, however, been employed by Napoleon, by the Allies against him at Gross-Beirin and Leipzig, by the Russians at Warsaw and Inkerman, by ourselves at Waterloo, in India, and the Crimea as far as we were able, although one great opportunity was thrown away, by the French in 1859 and by the Austrians in 1866. It is strange that the Prussians, who were then ahead of the other Powers in the weapon and management of their infantry in action, should not have observed these cases and changed their artillery tactics accordingly, but as Prince Kraft says, they still adhered to the traditions of 1813-15 up to 1866.

Napoleon's tactics were to commence an action by sending on light troops and opening a desultory cannonade from various points, to make the enemy compromise his whole force and obtain a knowledge of his position. At the decisive moment an overwhelming fire from a mass of artillery was poured upon a weak point of the enemy's line, and after it appeared to have produced the requisite effect, a large force of infantry, preceded by light troops, advanced to the attack, and accompanied by the light guns up to case shot ranges, cavalry being kept ready to complete any advantage gained. Against breech-loading small-arms and machine-guns artillery could not be sent forward to such ranges without risking annihilation: but there is now no necessity, as rifled guns can shoot as well at 1,200 or 1,500 yards as at 300 or 400 yards. Artillery may have to fire over the heads of their own troops when advancing to the attack, and our shells should, therefore, be made so that they may not be liable to premature bursting.

It is now generally held that artillery should not be kept in reserve, hence the Germans, and others after them, have changed the term

reserve into that of *corps artillery*; and it is pushed on as far forward as practicable on the march, so that by its fire it may conceal the movements of the infantry when coming into action. This might sometimes be hazardous, as pointed out by General Sir E. Hamley in his "Operations of War," 3rd Edition.

It is sometimes said by Officers of other arms that artillery Officers endeavour to make a mystery of their arm, and this complaint has been echoed even by some artillery Officers. I have seen little to justify such a complaint. The details of gun and ammunition are rather complicated in these days, but it is hardly necessary for Generals or other Officers to master these. All they want is to know—what the fire of guns can do under various circumstances, the spaces batteries occupy in different formations, with a general idea of their tactics. To obtain the first it would be wise to give General and Staff, as well as other infantry and cavalry Officers, when practicable, the opportunity of visiting Okehampton, Shoeburyness, and other Gunnery Schools, and observe the practice there; and these Officers might make valuable suggestions respecting the positions of targets representing troops and in other matters.¹ The others can be got from the drill book and the movements of artillery at manœuvres, if they are directed by General Officers and Officers commanding batteries, in an intelligent manner.

The orders issued by H.R.H. the Duke of Cambridge at Aldershot, just before the autumn manœuvres of 1871, abolished the old-fashioned notion still held by some Generals and Officers commanding troops—"that field artillery should *conform to the movements of the other arms*;" and detailed instructions are now laid down in the "Field Artillery Drill Book" as to the position and functions of Officers in action, the Officer commanding the artillery taking his orders as to the object required, from the General or other Officer commanding the troops. They are worded to secure unity of action with necessary control.

One of the great difficulties we have as a nation to contend against is the occurrence of a number of small wars in various parts of the world, against enemies of different kinds, some mere savages, others having firearms of a sort, others organized and possessing rifled small-arms and artillery, and at the same time to be prepared to take a part in a war on the Continent; and to take even a small part in such a war, where such enormous armies are employed, a great strain on our resources must always be placed. No one with any knowledge of the requirements of active warfare will deny that we are very weak in artillery. There is no field artillery for militia or volunteers, and but an inadequate amount for our regular Army, as I think I can show.

¹ I am informed by Captain G. A. K. Wiseley, R.E., that in Belgium every infantry regiment is required to send a Captain to attend for fourteen days the artillery gun practice, and, as there are seven of these courses annually, each regiment has seven Captains instructed every year. Captain Wiseley adds: "I was assured that this instruction is considered most valuable, as enabling the infantry to appreciate the progress in artillery."

It is, I understand, the intention of our authorities to have two Army Corps, organized so that with the help of reserves it may be put on a war footing without delay.

Now each Army Corps will require—

	Field batteries.	Horse batteries.
Divisional artillery	9	..
Corps artillery	2	3
Ammunition columns.....	7	..
	—	—
Total	18	3
Two Army Corps.....	36	6
Cavalry division.....	..	2
Ammunition column.....	1	..
Lines of communication	2	..
	—	—
Total batteries	39	8

Fifteen field batteries are to be converted into ammunition columns, but as we have only thirty-eight field and nine horse artillery batteries at home, we should be short by one field battery, and have only one battery of horse artillery and the depôts for emergencies and relief.

Now consider the condition of our batteries at home. Until just before I went to Aldershot in 1879, all our field batteries had 6 guns and 6 wagons, with 92 or 84 horses, but some of the wagons were then reduced. Not long after, in some batteries the guns were reduced from 6 to 4, and now there are 4 horse and 16 field batteries with only 4 guns. As a consequence the establishments were reduced, so that they have recently been weaker than they have ever been since the Crimean War.

The home establishments are now—

	Total ranks. Men.	Horses.
Horse artillery.....	{ 167	104
	{ 125	72
Field artillery	{ 166	86
	{ 154	74
	{ 115	50

The war establishments are—

Horse artillery.....	186	193
Field artillery	177	141
Reserve ammuni- { 1 section.....	190	221
tion columns { Other sections	207	258

Where are you going to get *trained* men and horses to make these numbers complete? You have a small reserve of artillerymen, but remember that you will want about one-third more men and horses to make up casualties after a few months' campaigning. The new

plan of registering horses in civil employ may give us numbers, but will they be trained to stand fire? And many of them will probably be much "used;" and, besides artillery, the cavalry, Army Service Corps, and other troops will require large additions.¹ Then you have India to provide for, and in the event of a war with one of the greatest European Powers, we should certainly have to fight there as well as on the Continent. You may get horses in India, but you must send men there in peace-time, and very large drafts during a war. Whether you form more batteries now or hereafter, as you may be forced to do, all batteries of field artillery should have six guns and six wagons, which is a mere peace establishment and which would not entail very great cost. I should like to ask what is meant by the heading in the "Detail of an Army Corps" of "Guns—four or six horsed." The Berlin correspondent of an English newspaper stated the other day that "in order to enable the German artillery to be mobilized as rapidly as the French, it is intended completely to horse it in time of peace, as is already the case in France."

In a paper recently written by Major-General Stothard, late R.E., in Colburn's "United Service Magazine," he gives ninety-six guns to a German Army Corps of 37,179 of all ranks; but some three years after the War of 1870, the artillery of the Guards Corps and first eleven Army Corps was increased to 102 guns, as I stated at the time on the authority of our Topographical Department. The French have a higher proportion than the Germans, but it is said that a Bill involving a very large expenditure is shortly to be introduced in the Reichstag to complete the German artillery. In our Army Corps we have only 84 guns to 34,984 men; 14 machine-guns are added, but they are not artillery, and if considered necessary will doubtless be added by foreign Powers to assist the other arms.

We are all aware of the difficulties to be surmounted, both by the military authorities and by the Government, in their attempts to carry out the recommendations of the former, when these entail the expenditure of money; but no effort should be spared to open the eyes of the British public to the deficiencies in our military and naval establishments. It would be folly to attempt to satisfy the ideal wants of certain soldiers and sailors, and some of these are rather apt to treat what should be a sober matter-of-fact question in a gushing or sensational manner; while the British public, upon whom, by our extraordinary method of politics, is devolved the power of consenting to or rejecting proposed measures, was said by one of our greatest authors to be "composed mostly of fools." Without endorsing such a sweeping assertion, it can hardly be denied that the British public is not very enlightened on military questions. I met a commercial gentleman when quartered at Sheffield a few years ago, who seriously maintained that it was a great mistake to keep up any army, and that

¹ At Aldershot last autumn four guns of a battery of horse artillery were equipped for service with a flying column. To make this reduced battery up to the requisite strength, the draught horses of the remaining two guns, the whole of the draught horses of another battery, and some of the draught horses of a third battery had to be taken.

war could be carried on most cheaply and successfully by entrusting the management of it to a contractor. Then, last year, in order to obtain evidence on the best methods of training Officers for the Army, a Parliamentary Committee called an accountant before them, whose opinions on such a subject were worth nothing, and he was questioned by an old artillery Officer, who should have known something of the matter, the result being, as was doubtless desired, a recommendation to abolish all military colleges and schools as too expensive, and trust to chance training, as was done some century or two ago.

I have no wish to criticize those who are endeavouring to place the Army on a solid footing, but there is a tendency to suppose that everything has to be commenced afresh. Much has been done during the last 30 years, and improvements have been constantly carried forward, although there was one period of stagnation. Many of those who worked hard and did most to improve matters have been got rid of, and their successors are not always grateful for advantages already secured. Our armaments have been immensely developed; both Officers and men are better educated and trained; the science and practice of gunnery, musketry, engineering, mining, &c., have made great strides; short service has been adopted, which has given us a reserve of men; the Volunteer Movement has been established; the transport, supply, and other services have been placed on a recognized footing; autumn manœuvres and minor tactics have been practised; and a number of small wars have kept alive the military spirit, and, to some extent, tested our deficiencies. As for the artillery, which has been re-organized several times since the Crimean War, an important step was taken shortly after, in placing field batteries on a proper footing by making them permanent, and giving them a proportion of drivers, and their mobility was afterwards increased by mounting the gunners on the limbers, axletree-seats, and wagons; but few would say that the present incomprehensible organization of the regiment is satisfactory.

I trust that no one will suppose that in what I have said I have made any attack on so distinguished a soldier as Lord Wolseley. I have certainly contended against one of his opinions, which I and many others consider unsound, and my reason for doing so is, that his opinions naturally carry so much weight from his abilities and position. I have, however, confidence that Lord Wolseley is not above modifying his opinion if facts show that change is necessary; and I hope that what I have said, together with remarks made by others in the discussion, will appear to him sufficient to induce him to reconsider his low estimate of the destructive power of artillery. What, however, I particularly wish to point out is, that we should ascertain practically what we can do with our various weapons, and then suit our tactics to their special purposes. Shrapnel shell, common shell with high explosive bursting charges, quick-firing and machine-guns, and magazine rifled muskets all claim to do great things, but practice *under service conditions* can alone decide their relative values and proper positions. Having ascertained these, our Generals and the troops under them may go into action with the confidence of being able to employ them to the best advantage. What

the Germans accomplished in four years, between 1866 and 1870, by the establishment of a school of gunnery, and by changing their obsolete artillery tactics to meet new conditions, shows clearly what can be done in peace-time to prepare for success in war.

There is another thing I wish to say before sitting down. Both before and after the Crimean War, pamphlets were written, one by a Russian General and the other by a British Colonel, to show that artillery had become the *principal arm*. I have had no intention of making any such claim, and repudiate the idea, as Colonel C. Brackenbury did at Aldershot, although some of those who spoke after the lecture thought that he had attempted to show that artillery could always *annihilate* any troops opposed to them. The bulk of the Army must be infantry; no position can be taken or kept without it, and infantry must, therefore, be the *principal arm*; unless, among those high explosives we hear so much about, we can discover the *vril* of the *Coming Race*, when no troops of any kind would be required. All I claim for artillery at the present time is, that if properly equipped, organized, trained, and employed, it can give very great assistance to the other arms; if—even well organized and equipped—it be badly trained and handled in action, these other arms will suffer great losses in endeavouring to accomplish their objects, besides running the risk of defeat and disaster.

Results of Practice at Okehampton in 1888 with the 12-pr. B.L. Gun.

(1.) Target,—A single line of 70 standing dummies, about 1 yard per dummy.

Range varying from 1,500 to 1,750 yards.

4 common shell to find the range, and then a group of shrapnel from each battery.

Battery. ¹	Number of shrapnel.	Number of hits.	Number of men hit.	Remarks.
1	14	131	22	} Fired with percussion fuzes.
2	14	66	16	
3	14	26	20	
4	14	31	22	
5	9	72	39	
6	11	59	25	

(2.) Target,—3 rows of standing dummies, 35 dummies in each row, 10 yards between the rows :—

¹ The numbers in this column are put to distinguish the groups of shell fired from different batteries of horse and field artillery, the letters and numbers of which are purposely omitted.

35 yards.

10
10

Range varied from 1,950 to 2,100 yards with different batteries.

4 common shell to find range, and then a group of 14 shrapnel from each battery.

Battery.	Number of hits.	Number of men hit.	Remarks.
1	83	46	} Fired with percussion fuzes.
2	110	55	
3	116	62	
4	117	53	
5	143	67	
6	111	30	
7	140	34	
8	154	48	
9	61	40	
10	330	63	
11	145	39	
12	90	29	

(3.) Target,—Scattered infantry, retreating across a ravine, represented by 45 standing dummies scattered about in twos and threes.

Range about 1,000 yards.

4 common shell to find range, then 6 shrapnel.

Battery.	Number of hits.	Number of men hit.	Remarks.
1	50	25	
2	23	17	

(4.) Target,—An irregular line of standing dummies, towards which the 3 batteries composing each detachment galloped in line about 300 yards down hill over rough heather, and then came into action at ranges varying from 300 to 450 yards. Each battery fired 15 rounds of case shot. The line of dummies was divided into 3 groups to allow the result of each battery's practice being distinguished.

Battery.	Number of dummies fired at.	Number of hits.	Number of men hit.	Remarks.
1	27	127	25	
2	25	201	25	
3	20	97	20	
4	20	27	15	
5	20	63	19	
6	20	45	18	

(5.) Target,—Battery in action represented by 6 dummy guns, and detachments of 5 dummies to each, making 30 men. The limbers were represented by canvas screens, which did not give trustworthy results, but on service the limbers might often be under cover.

Range about 1,900 yards.

12 rounds of common¹ and 12 of shrapnel shells were fired from each battery.

Battery.	Number of hits.	Number of men hit.	Remarks.
1	34	10	
2	35	14	
3	30	17	
4	13	10	1 gun detachment blown to pieces.
5	50	16	1 gun disabled.
6	56	18	" " " and 1 dummy
7	15	10	blown to pieces.
8	20	12	
9	14	10	1 gun disabled.

(6.) Target,—30 standing dummies in line.

Range about 200 yards.

12 shrapnel shell from each battery, with fuzes set to burst at the muzzle.

A good instance of the destructive power of shrapnel practice was the following, the results of a group of 10 shrapnel fired at Okehampton last year.

¹ The steel common shell for the 12-pr. is so tough that it simply tears open, and is practically useless against troops, though its large bursting charge makes it very effective against earthworks, &c.

Battery.	Number of hits.	Number of men hit.	Remarks.
1	29	19	Result not good. ¹
2	13	6	
3	18	8	

Target,—A subdivision. Gun and limber, the latter represented by a canvas 6' × 6' screen; the detachment and horses being represented by 13 dummies, those for the latter not being so large as horses.

Range 2,650 yards.

Results.—147 hits on horses and detachment.

60 „ the gun.

15 „ the limber.

Total. . . . 222 hits.

The instances of practice at various objects given above have been taken from the records of practice carried out at Okehampton by the batteries sent there last year. The practice was arranged and the results collected by Colonel Murdoch, R.H.A., who commanded the camp, with the assistance of his orderly Officer, Lieutenant J. Headlam, R.H.A. The number of shell fired in each group was small, the object was to get as much instruction as possible out of the ammunition allowed for practice. The ranges were never measured, but found by the range-finder and trial shells; the ground is rough, with considerable differences of level between that on which gun and target respectively stand, and the weather was generally bad.

Colonel E. MARKHAM, D.A.G., R.A.: The very interesting paper which has been read by my friend General Owen is what we should have expected would have come from his pen, as we know he has studied the subject for so many years. The heading of it is, "The Value of Artillery in the Field;" but it seems to me it has rather become a historical sketch of the field artillery of this country up to the present day. He has traversed a very great deal of ground; I do not intend to follow him over the whole of it, but there are a few remarks that I wish to make. He has alluded to the mobility of the artillery, which is most important in the field, but he has not mentioned what he considers should be the proper calibre of guns for the horse and field artillery. He has, however, mentioned a 6-pounder as proposed for horse artillery. I presume he alluded to a quick-firing gun, because it follows what he has mentioned regarding quick-firing guns. In that I think he has made a mistake. Mr. Nordenfelt will correct me if I am wrong, but I believe it should be the 8-pounder quick-firing gun which is going to be tried this year at Okehampton. He also, in alluding to shell fire, said he thought there ought to be certain batteries, attached to an army corps, of field howitzers. We have also this year brought forward, and are going to try at Okehampton, some field howitzers,

¹ The unsatisfactory result was due to the shortness of the range, some of the shells bursting only just before reaching the target. Good results would doubtless have been obtained at 300 or 400 yards range.

4·25-inch bore, which will be tested against the 20-pounder guns which we tried last year, both very powerful guns. General Owen was quite right in saying that measures have been taken to try and remedy the immense recoil given to high velocity guns. We are trying a carriage now with recoil buffers : they have been tried already with the 20-pounder, and also on the field howitzer carriage. Alluding to the practice of picking up ranges, it is a very important point, and I think our instruction is keeping pace with the improvement of the gun. We draw up our rules every year, and they are revised from experience gained the year before. I must say I should like to see several Officers of other branches of the Service go down there and see the shooting ; I think they would then appreciate the fire of artillery, and they would see that our artillery is not behindhand in the instruction to the Officers and men. General Owen alluded to certain Officers thinking that the artillery made a mystery of their arm, but he thinks that this idea is now exploded. I think it is so. I can assure you of this fact. Last year I went to Okehampton in company with two General Officers of infantry and several others, one a cavalryman. I believe they came away very much impressed with what they had seen of the fire of artillery. I may also mention, although it has nothing to do with this paper, that a General Officer of cavalry, who commands a district in England, attended a course of gunnery at Shoeburyness last year. I think this proves that the artillery service is not kept in the dark at all, but that we as artillerymen are only too glad to see other Officers of different branches of the Service take up the question, and come and see what artillery can do. I rather wish—but perhaps it was a little outside the limits of the lecture—that General Owen had alluded to the selection of positions for guns in action. This is a question which has cropped up lately, and is rather important, and has been under consideration ; and with reference to the supply of ammunition, where the limbers should be placed. Of course we have in these cases been obliged to pick our knowledge from experience gained in foreign countries, but it would be a very difficult thing to draw a hard and fast line as to where the position of limbers should be for the supply of ammunition ; it depends so much upon circumstances, upon the nature of the ground, upon when you are going into action, whether you are engaging an enemy who already holds the ground, or whether you have the advantage of selecting the position and waiting for him to attack. We have now been drawing up a new Manual of Field Artillery Exercises, in which we have considered all these questions, and also that one of keeping the limbers away when they come into action, and bringing up some of the wagons, so that when an advance is necessary you have your limber full of ammunition and ready for the work. I see, looking at the table before me, that General Owen has talked about the number of our batteries, and how inadequate they are for the defence of the country. I am happy to say that that table shortly will not prove quite correct. He puts fifteen batteries with the ammunition columns. Arrangements are now in preparation to gradually work these out, so that there will not be a necessity to convert field batteries into ammunition columns. With reference to finding men and horses in these large numbers, we find the reserve is sufficient to provide men for the first army corps to fill them up to war strength. When we have our ammunition columns arranged, and have no longer to convert batteries for that purpose, we shall find that we have a reserve of some fourteen batteries to draw upon after providing two army corps complete. No ammunition columns could be kept up in peace-time : I think that will stand to reason to everyone, for what will be their duties ? You would have a lot of men and horses, maintained at great expense, practically without employment. After that we come to the militia and volunteers. General Owen says they have no field artillery. No, they have not : but they have a very large force now of guns of position. They have 104 40-pounders, 28 20-pounders, and 132 16-pounders, or 264 guns in all ; and 252 of them are actually in the hands of the volunteers. They are horsed in different ways, some with farm horses and harness, and some of them have applied and have received permission to purchase artillery harness, and drive in the same way as the Royal Artillery. I have only mentioned these few points, because I am in a position to inform General Owen how they stand.

Colonel LONSDALE HALE : I rise at this early period of the discussion because I

have to go away immediately and superintend the firing of leaden artillery, and the movements of leaden soldiers elsewhere. I wish to express the hope that either the lecturer or some artillery Officer will give us some information upon one of the most important parts of the duties of artillery in the field—the value of field artillery, as it is at present, against localities, in which I of course include substantially built villages. Nobody has a firmer belief in artillery than I have myself, but what I should like this afternoon would be that some artillery Officer should give us reliable information on the subject, and I trust it will be of a reassuring character. Supposing a battery came into action in Hyde Park, and fired away at houses of the character of those built in Park Lane, what effect would that battery produce upon those houses? My friend Colonel Brackenbury has lately brought this subject of localities before the public, and he is not a more ardent believer than I am in the part that the defence of localities will take in any future war. I differ from Colonel Brackenbury, perhaps, in his view of the shelter trench part of it, but at the same time I firmly believe that the points that will be held on a battle-field will be strongly defended buildings and villages, and garrisons will never be turned out of these unless the artillery can help to do it, and do it effectively. I have been lately studying the details of the defence of the position of Faily-Noisville, and, so far as I see, the effect of our artillery at present upon localities and upon garrisons of localities will be very much the same as the effect of the French artillery upon the Prussian garrison at Servigny. The French artillery fired shells, and set fire to the village in a few places, but with regard to the garrison, they did not care two pins about it. What we should like to know is, whether, with the artillery missiles which we possess at present, we can with a small force of artillery render a locality untenable. Supposing that locality is not made of paltry little houses, how far well-built houses can be rendered untenable either by the fire of common shell or shrapnel. I am quite aware that if you get enough guns you can knock any village to pieces if you have time to do it and have enough guns like the seventy-eight which battered Noisville on September 1, 1870; but we have no authentic information as to the actual effect of the present shell, not the shell of the future, which is to be invented, with high explosive compounds, and so forth, but merely the shells of to-day. Can artillery Officers here undertake to turn a garrison out by firing common shell and shrapnel, provided the garrison are placed according to common sense and properly under cover? That is the point on which I hope artillery Officers will give us information this evening.

Colonel MAURICE, R.A.: I propose to restrict myself to one particular point of this most valuable and interesting lecture, that is, as to the question of moral effect as connected with the material effect of artillery, and the references which have been made to the mode in which that subject has been dealt with by three friends of my own in the other arms of the Service, the late Colonel Home, R.E., General Clery, and Lord Wolseley. I, for one, certainly believe most surely both in the material effect which is produced by artillery, and in the enormously enhanced material effect which will be produced by artillery with our improved sights and our improved guns. But for all that, I cannot admit that it is a disparagement to our arm of the Service to say that its great feature is the extraordinary moral effect which it produces. Take any other arm of the Service: take the infantry. We are all agreed that if it were possible for the infantry habitually to fire volleys instead of engaging in individual shooting, it would be most desirable that they should do so, and it is only because volleys cannot as a rule be fired in action, that we are unfortunately obliged to abandon volleys, and to restrict ourselves chiefly to independent firing. Now the enormous difference between volley firing and independent firing is simply a difference in moral effect. The whole of that marvellous story, which has been told again and again by French writers, even better than by our own historians, of the successive victories of our troops in the Peninsula against French troops has been acknowledged again and again to prove the moral effect produced by infantry fire delivered suddenly and at a given moment. Therefore it seems to me it ought not to be looked upon as a disparagement of the efficiency for victory winning purposes of the artillery to say that the moral effect produced by artillery fire is greater in proportion than the material effect which it also produces.

The reason why that great moral effect is produced is, I think, a very simple one : it is precisely that you get out of the destruction which is produced by artillery just that effect which you would try to get, if you could, from the employment of infantry. The blow when it is struck has the sudden taking effect of a volley. The shell when it bursts effectively at all produces an appalling and tremendous effect on one spot and at a given moment. It is a very serious thing, as General Owen has said in his lecture, to see, as I have done, a couple of horses and men struck over by a single shell ; it is a thing that produces an immense effect upon the minds of the men who witness it at the time. And, as it seems to me, the whole use of the arm, and its proper tactics, are determined by realizing that it is this moral effect which, if we are to win victory, we must enhance in every way. As far as I have observed myself, and I have found my observation confirmed by people who have seen far more effective artillery fire than I have, what continually happens under the fire of artillery is this : those who are exposed to it for the first time fully realize that a shell carries with it the possibility of that tremendous destructive effect of which I have spoken, and as soon as shells begin to hurtle through the air the first few rounds tend to produce an enormous moral effect. But after a little time men observe that there are a great many shells which produce no material effect, you have plenty of time to watch them, to see them down, and you see that they produce no effect, and this goes on for a long time, before the next destruction is produced by an effective shell. It is almost always soon after the beginning of artillery fire that this loss of moral effect is apt to occur, because artillery usually begins at long ranges, and because the range has not been quite so accurately found as it is later in the action. Not being at that time in danger of infantry attack the troops under artillery fire can then better than afterwards take cover from it. For various reasons of that kind the early period of artillery fire rather tends, unless it is a very concentrated artillery fire, to undo its own moral effect. You have plenty of time to watch every shot with artillery as you have not plenty of time to watch every shot that is fired from the immense mass of unaimed ineffective infantry fire. You cannot count bullets coming through the air, but where you see shells, as you may do, coming and exploding harmlessly, it tends very greatly to discount the moral effect of artillery. For my part I have always believed, and I think I am right in that opinion, and I have generally confirmed myself by comparing notes with other people, that the enormous importance to us of concentrated artillery simply depends on the great moral effect which is produced by the concentration. Because if you have an enormous number of guns operating upon a single point, and the shells bursting in the air all about you, there is no time to make the calculation as to the material effect between one shell that does strike and spread ruin and the next that does so ; and, therefore, seeing that there is continually a certain amount of destructive effect, and the shells are continually coming, the shells that don't strike tend to enhance the moral effect instead of reducing it as they do when there are long intervals without effect. Therefore it seems to me of the greatest importance that we should recognize both in the use of artillery and with regard to the power and effect of the arm, that it should be so employed as to produce that which is the object of all war, which is in all cases and in relation to all arms of the Service the grand thing at which we aim, which, as Napoleon said, counts for nine parts in ten in battle, the production of moral effect. I believe, myself, that the very great increase which we are making to the future material effect of the gun will very greatly enhance that moral effect, and that any future successes will be due not merely to the material loss which will be occasioned, but because of the enhanced moral effect which the artillery will on that account produce. I want to turn to another question in connection with that, and that is the relation of artillery Officers towards the other arms of the Service, in the view which they would wish them to take of their arm. I do not for one moment believe that there is the smallest fear that Officers of other arms will underrate the effect which our own particular arm of the Service, the artillery, will produce in the next campaign. But supposing you were in command of a body of cavalry, dealing with a body of infantry, would not you wish to inspire that cavalry with a feeling that you intended so to lead them against the infantry against which they were going to be engaged, that you would never allow them to do anything

else than to go forward to victory, that never should they have to come disastrously under the killing power of infantry, but that, taking advantage of the rapidity of your movements, and the facility of your manœuvring power, with your knowledge of ground and your skill in using it, and your power of striking round the flanks of the enemy, you would always gain the victory no matter what weapon might be in their hands? And, on the other hand, if you were in command of a body of infantry, resisting that very cavalry, would not you wish to inspire that body of infantry with the feeling that if they are only able to keep command of themselves and keep steady with their weapons, they will most assuredly win? When you come to criticize these books which are written for the instruction of cavalry and infantry Officers, it is not for the advantage of the artillery any more than for the advantage of any other arm of the Service that the infantry and cavalry who are going to co-operate with us should fear the guns that are to be used against them by one of the enemies of England. It is not against them that we are going to use our guns, they are going to join us in fighting against the guns of quite another Power, and I am perfectly certain that to take the specific instances of which Colonel Hale has spoken, the feeling which actuated my friend Colonel Home in speaking mainly for cavalry and for the infantry which must be, of course, the most important arm of the Service, he had this object in view, and had no object whatever in disparaging the artillery. As a matter of fact, I may say Colonel Home's unfortunately premature death, which is one of the greatest losses the Service has had in my time, has deprived us of the enormous advantage of the successive revisions which his book would have received had he lived, and I can answer for it from my own personal knowledge that that book as it stands does not in the smallest degree represent his final views or anything that he would now be satisfied with, had he had the means of carrying out the revision which he would have wished to give to it; therefore, I may admit that there are certain things in it which I should well wish out of it, valuable as it is and instinct with his peculiar soldierly genius. In relation to the particular statement made as to General Clery's book on "Minor Tactics," it is simply a question of fact. There is the book. It is one very familiar to most Officers, and I can only say I have this afternoon carefully gone over the chapter on the relation of the three arms of the Service, which is the one in which all these questions of artillery are mainly or entirely dealt with, and there is not a single illustration, a single instance, taken except out of the war of 1870. Colonel Hale has long since abolished for us all history prior to the war of 1870. I want to know whether all illustrations from the 1870 campaign are also to be abolished? I quite admit that we are going to have an enormous increase in the power of artillery in the future, but, for the purpose of a text-book, it is impossible to deal with other than the experience of war, and I do not think the attack is quite a fair one upon a text-book which is prepared for a certain specific purpose, and which must deal with the actual events of war, and not with the opinions which we naturally form as to the future of our own arm. Lastly, I should like to say one word about what has been said in relation to Lord Wolseley's "Pocket Book." That book was originally written when he was a Colonel of infantry in Canada, and the very passage which is quoted is directed to the particular effect which ought to be produced upon the minds of infantry who may have to face artillery in the field. I confess myself I should be very sorry to do other than inspire our infantry with the utmost confidence, and as I have urged the effect of artillery is unquestionably, from its nature, to produce a moral effect out of all proportion to its material effect, great as that material effect is, therefore, most assuredly, I should like as far as I possibly can, speaking as an artillery Officer, to discount for all our infantry Officers who have to come into action against artillery, the moral effect which the artillery of the enemy will quite sufficiently produce upon them by its material effect. I have no doubt that that was the motive with which that particular passage was introduced. A passage which originally was written by a Colonel of infantry, speaking especially to his own arm of the Service, has through successive editions become the work of the Adjutant-General of the Army, speaking to the whole Army. In that position I still say that the most important duty of a man who wants to carry forward the Army as a whole to victory is to discount as far as possible beforehand the tremendous moral effect which will be assuredly liable to be produced by the striking and

dramatically appalling effect produced by hostile artillery. There is no fear that he will shake the confidence of artillery Officers in their own arm. I can say positively that no man has more confidence in the artillery than Lord Wolseley. If I may venture to say so, in a mixed assembly of Officers like this, not once, but again and again Lord Wolseley has said to me, as he has said to others, "I do not say this because you are an artillery Officer, but because I find it so—the artillery Officers are the best Officers of the Army." Therefore I may assure you that it is not from some special prejudice against the artillery that Lord Wolseley has spoken in the way in which he has done in the "Pocket Book." He has the most complete confidence that nothing that he says will in the smallest degree shake the confidence of the artillery in their arm of the Service. The very best effect that could be produced upon the rest of the Army is to tell them to go forward against the artillery of the enemy with every possible confidence, and to discount as far as possible, by statistics or otherwise, the tremendous moral effect which the immediate and striking material effect of artillery tends to produce¹

General Sir GERALD GRAHAM, V.C.: Not being an artilleryman I venture to add my testimony to Colonel Hale's as to the value of artillery in the field. I had not the advantage of being present at Colonel Hale's lecture at Aldershot, but I have heard him lecture at this theatre on a similar topic, and I think, on that occasion, he somewhat successfully demolished much of the statistics that are relied on to prove the inefficacy of artillery in the field. I am only sorry that he had to leave us so soon this afternoon, and did not re-enter on that subject. I can state my belief, not only in the value of artillery, but that our artillery is the finest in the world as a service, and I am happy to hear that confirmed by so high an authority as Lord Wolseley, as quoted by Colonel Maurice just now, as regards the artillery Officers. There is one point I should like to refer to, as coming from an Officer of General Owen's great experience and authority, and that is his opinion of quick-

¹ In speaking I omitted to draw attention to an obvious misunderstanding of some importance as to the phrase used on p. 121 of the last edition of the "Soldier's Pocket Book." "In previous editions of this 'Pocket Book' I have laid stress upon the fact that the effect of artillery fire is more moral than actual, and I trust that these figures will make the Army, especially the infantry, fully recognize the truth of that assertion, and put a stop to the cry for more guns which one still hears occasionally." The last phrase has I find been supposed to imply that Lord Wolseley is content with the fact that we have hitherto had no guns for the home Army, volunteers, and militia at all. This is purely a misreading of the text, which simply objects to an increase in the proportion of guns in the field beyond the 3·75 per 1,000 men which Lord Wolseley has elsewhere spoken of as a maximum. As a matter of fact no one has represented our deficiencies in respect of the home Army more strongly than Lord Wolseley. I was, when Colonel Scott came in, on the point of saying that we also owe entirely to Lord Wolseley what all artillery Officers now recognize as at least one of the most important improvements in our time of the artillery arm—Scott's sights. I may add that from the point of view maintained in my speech, no evidence subsequent to the War of 1870, as to the future material effect of artillery in war, affects the argument. If the victory winning effect of artillery due to its moral effect was so great, as we know it to have been at Sedan, where the Emperor declared that he surrendered to the artillery, the whole question is whether *in that war* the material effect was such as with any other arm would have produced that moral effect. If not, for heaven's sake let our infantry and cavalry know and understand that fact. They will need all their knowledge of it, and all their national phlegm to resist the moral effect of the appalling material effect which artillery will produce in the next war. The technical phrase that it is the duty of artillery "to prepare the way for attack" means that it is their duty so to shake the nerves of the defenders that they may succumb to attack. Ought artillery Officers to wish that their own Army should be prepared beforehand to succumb by cramming down their throats all possible evidence as to the reality of the danger, or should they wish rather that the Army should know that, bad as it looks and is, it looks worse than it is.

firing guns. He says: "I cannot see how they could be used to any extent in the field, as they require to be fired continuously from the same position without recoil." I should be glad to hear from General Owen why the fact of their being fired continuously, without recoil, should make them of no use, or of little use in the field. I should have thought, on the contrary, it would have enhanced their value in the field. General Owen says: "I have often thought that our field carriages might be improved by having recoil slides, or some arrangement for lessening recoil. If the recoil could be prevented, both the accuracy and rapidity of firing would be increased, the labour of running up would be avoided," and so on. It appears to me that General Owen there recognizes the value of non-recoil carriages, and, therefore, I cannot quite understand the first part of the paragraph. General Owen also says, "They might, as their advocates say, fire a greater weight of metal in a given time; but I think that is a fallacious comparison." That is with reference to the small calibre of the 6-pounder gun. Colonel Markham has already observed it is an 8-pounder gun, but I wish to inquire why the above should be called a "fallacious comparison." I should have thought that for a light gun to be able to fire a greater weight of metal in a given time than a heavy gun would be an enormous advantage. Referring to the subsequent remark of the lecturer on the great importance of lightness and the long marches performed by artillery quoted from Prince Kraft, the enormous importance is obvious of having light guns, and everyone who has seen any service will recognize that as a most important factor in the gun. Those who were in Egypt will remember that the 13-pounder we had there, though a most valuable gun, was too heavy for the sand of the desert, and could not be brought out and made full use of on account of its weight. A light gun that will throw an equal weight of metal and produce a greater intensity of fire must have an enormous advantage over the heavy gun, even although each individual round may not produce the same effect. The 6-pounder referred to may be fired at the rate of 40 rounds a minute, which is a very great intensity of fire, and it is a very light gun. Reference is made to the Maxim as being merely a machine-gun. Of course General Owen is aware that there is a light shell-firing Maxim, a 37-millimetre gun, that fires 300, and has fired 400 rounds a minute. There you have a light machine-gun where you have the advantage of seeing the range, and, therefore, there would no longer be the same objection made to it that there is to other machine-guns where you could not observe the effect at a long range like 3,000 yards. The reference to the mitrailleuse is, I think, somewhat misleading at the present day. At that time the tactics of machine-guns were not understood, they were employed against artillery at long ranges, and, of course, entirely failed. It is very remarkable that they should have been able to hold their own against artillery on any occasion, as stated by the lecturer, as it is not intended to use machine-guns against artillery at long ranges; in fact, they should replace infantry, as they may replace long-range infantry fire, but can never be intended to replace artillery fire. There is one point on which I quite agree with General Owen, with reference to the quick-firing guns, that great care would have to be exercised to prevent the quick firing being indulged in too often or too long a time, in consequence of the running out of ammunition. That is perfectly true, and the same objection applied to the development of the muzzle-loading rifle into the breech-loader, and replacing the breech-loader by a magazine rifle. It is a question of fire discipline and training. I think with our artillery we have less to fear from lack of fire discipline than we have with our infantry; the training is higher, and there is not the same difficulty in restraining a gun detachment as there is in restraining infantry in action. It is a matter of nerve, and a gun has no nerves. In my humble opinion all these new introductions are an advantage to us who, as a nation, I believe have better nerves than most other nations. Our men want nothing but training, and the better developed weapon put in their hands will be turned to better account by the British soldier than by the soldiers of more excitable nations, since the greater control is required over the nerves for the arms of the present day. So that the objection to quick-firing guns, that they will tend to waste of ammunition, I think does not apply, assuming, as the lecturer does, that they will be used on both sides, which will always be to our advantage. This leads to the question of the supply of ammunition—one of the most im-

portant questions of the day. I do not know that the lecturer has attempted to solve it, but he has mentioned several very important points on which I shall be very glad to hear the opinions of artillery Officers. They have already been referred to to some extent in regard to placing the wagons in line, and to taking nothing out of the limbers before emptying the wagons. I feel very much reassured by the remarks made by the Deputy Adjutant-General of Royal Artillery. It is a great relief to us to know that so much is being done to improve the organization of the Royal Artillery, more especially with reference to what he has said as to the ammunition columns.

Captain F. G. STONE: I only wish to make a very few remarks, first with regard to what General Owen said with reference to placing the bursting charge of the shrapnel in the head instead of in the base. To the best of my belief the object, or at all events the result, of placing the bursting charge in the head of the shrapnel, is not principally to secure a few additional bullets, but to ensure the quicker ignition of the bursting charge, the result being that it has become possible to use percussion shrapnel with remarkably good effect, in fact with equally good effect as time shrapnel up to ranges of about 2,000 yards on ordinary ground. This, I think, is a most enormous gain in the power of artillery fire, and it is not by any means merely a question of having a few more bullets in the shrapnel. With regard to the bad execution done by the mitrailleuse in the war of 1870, in the first place it was due to the fact of the weapon being extremely clumsy, and secondly, because the Officers and men did not understand technically or tactically the nature of their weapon. With regard to Major Hutton's remark at Aldershot, which General Owen has quoted, referring to the Nordenfolt machine-gun in Egypt, that their firing was very erratic, Major Hutton pointed out the reason for the indifferent practice by saying that they were not firing *from a level platform*. Of course no gun, whether a 40-pounder gun firing shell or a machine-gun firing bullets, would be expected to fire correctly unless its wheels were on a level platform or a compensating sight was used. I venture to think the objection is not to the gun in that case, but rather to the utter absence of training which appeared in the gun detachment. It is mere A B C to any recruit in the artillery that the wheels must be on the same level in order to shoot accurately, and that if the platform be not level, compensation must be given by means of the sights; unless men are properly trained in the use of their gun you cannot expect the gun to work of itself.

Captain SALTMARSH, R.H.A.: General Owen asked me a few days ago to give a few examples of the effect of artillery practice at Okehampton. In 1887, with the two 20-pounders which I commanded there, we fired a quarter of an hour at a range of 2,100 yards at targets to represent a regiment of cavalry in quarter column, and we put 2,000 bullets into the targets. Four guns afterwards, I believe, put from 3,000 to 4,000 bullets into the same targets. With regard to what Colonel Hale said as to the destructive effect of shell, I may mention the effect of firing with a 20-pounder common shell with a percussion fuze on the block-house down there was wonderful. The block-house was constructed of two rows of timber from 6 to 8 inches in diameter with from 6 to 7 feet of earth between. The first shell from the 20-pounder passed through the first row of timber, burst in the earth inside, and completely opened the second stockade behind the timber, making an enormous breach in the block-house. There was something more than moral effect in that, as you can imagine. Then, again, as to what Sir Gerald Graham said about our guns being too heavy. The lighter nature of guns, I think the 13-pounder and the 9-pounder, in 1887 made no effect whatever on this block-house, or nothing to signify. I mention this as showing the great advantage in some circumstances of having heavier field guns. One can imagine what the effect of shell of this kind would be in village fighting, where the church or the factory, obstinately held by the enemy, would be completely demolished by the shells of this new gun. As regards accuracy of practice, I may mention our competitive practice in 1888 with the 12-pounder B.L.R. gun. Two out of ten men struck a 6-foot square target at 1,500 yards twice out of three times, and several other men struck it once. If this can be done we may hope that they would be able to strike a machine-gun at that range before the machine-gun could do them any very great injury. When speaking of the practice of artillery against masonry, Colonel Hale

would like to know what effect it would have. I do not think it would be very hard to have masonry erected at Okehampton; it would be exceedingly interesting to see the effect of the different projectiles thereon, especially as in any European war there is a good deal of fighting done in and about villages which are frequently the turning points of actions. There is one point which has not been noticed, and that is the effect that the use of signalling should have on artillery fire. Commanding Officers frequently train one or two of their men to signal, but we have no authorized signallers in the batteries of our artillery. I think there should be an establishment of two or three signallers in batteries of field artillery; they ought to be paid as such, and their status should be recognized just the same as it is in the cavalry. Last year we trained two signallers in my battery, and I think the practice was decidedly affected by the fact that the observing party and the Commanding Officer could communicate thereby with facility.

Mr. NORDENFELT: The paper is so full of interesting and suggestive matter that we should take up a week were we to discuss it fully. I want just to emphasize the exceeding necessity of the rearrangement of the Shoeburyness Establishment. I have done so once before last year in this room. In France, the Marine Artillery, only for marine purposes, has an establishment of sixteen Officers, who are working from morning till night. We, in England, have for both weapons—Army and Navy—an establishment where, I believe, there are three artillery Officers, exceptionally clever men, altogether overworked, who have not only to carry out these experiments for us but also to test ammunition and do all sorts of things which no one human being can possibly do, and which they do their best to do. Surely, instead of spending 20,000*l.* a-year on experiments and getting a blowing-up in the House of Commons, if you spend 200,000*l.* I believe they would thank you for it. In France, I believe, they spend about 300,000*l.* on the Marine Artillery alone. The question of small calibre guns as against large calibre is exceedingly interesting, and I hope when the 8-pounder quick-firing gun comes to trial we shall have some very interesting results. Prince Kraft von Hohenlohe gives 3,800 yards as the range at which shrapnel commences to have effect, and from 1,500 to 2,000 yards as the period at which shrapnel is decisive. There is not the slightest doubt that quick-firing guns, be they 6- or 8-pounders, are fully effective up to 3,800 yards, when they have a decent initial velocity. I do not mean to say they have the same effect as 12-pounders at the longest range; I do not say that they have the same effect against buildings, but I should like to see the effect of fifteen 8-pounder shots a minute containing mélinite against two per minute of the field-gun. I do not think there will be much difference on the whole. Colonel Maurice spoke of the suddenness of effect. I am working with a range-finder in which, up to 4,000 yards, we have an average fault of about $\frac{1}{2}$ per cent. That means, I can send up a range-finder beforehand, I can take a distance 2,000 or 3,000 yards away; the enemy does not see that process; I can then get up the battery or quick-firing guns, open fire for a minute or so at a range which I know within $\frac{1}{2}$ per cent., say that it is 4,000 yards—the fault would be 20 yards—I can fire a minute fifteen or thirty rounds and gallop off again. I cannot imagine any moral effect and also material effect greater than would be produced by firing five times as many shells per minute, although each shell is only 8 lbs. as against 12 lbs. You cannot look out for these shells, they come over you as a mass of fire. I believe that it was mass-fire that Lord Wolseley meant when he asked Mr. Maxim whether he could make a machine-gun to fire lead bullets at a long range. Mr. Maxim made one $\frac{1}{2}$ -inch calibre. Since the O'303 gives such excellent results for the distance at which shrapnel is supposed to be decisive, personally I do not believe it is necessary to go to any other calibre, but with the range-finder when I can stand here, knowing my range, fire for a minute or two, then gallop to another point from which I also know the range by having taken it at the previous firing point, unlimber, fire another minute again, and then repeat the same somewhere else, each time knowing the distance, I am perfectly certain the result would be worth studying. I would like to say one word in all kindness. One of the remarks General Owen has put forward is that Major Meham, at Aldershot, does not believe in the fire of machine-guns. Major Meham forgot in his report to mention the comparative time of fire. The machine-gun fired, I believe, for one and a half minutes, the

infantry fired for twenty minutes. Besides, I am not quite certain that a musketry instructor, clever and intelligent though he be, is altogether absolutely unbiassed as between rifles and other arms. I do not want to say a word against Major Mecham, he is a clever and experienced Officer, but he is a musketry instructor. I want to say one word more about the quick-firing gun and machine-guns, and it is this: the new powders we are getting are absolutely smokeless; that is to say, the man who fires can see through the haze, but the enemy, if they are a mile away, see only the bluish haze and cannot see the man who fires. These powders are also practically noiseless, at 100 yards or 200 yards from the gun you hear a noise, but no noise of any kind is heard 1,000 or 1,500 yards away. That means that if I have found my range and fire for a minute, I am almost satisfied that quick-firing guns or machine-guns will have the required effect before the field gun is actually ready to commence to fire.

Lieutenant-Colonel SCOTT, R.E.: General Owen has given us a very clear and interesting lecture on the value of artillery force in the field, in the hopes of convincing unbelievers in its efficacy; but if he thinks that they will be convinced by words alone he is much more sanguine than I am; I have already tried that game. To be convinced, they must go and witness with their own eyes the terrible effect of modern artillery fire on the practice ranges at Okehampton, which privilege I have myself enjoyed by the courtesy of the Royal Artillery, for several years, and then they will change their opinions as did a very distinguished General Officer who, to the great satisfaction of the Royal Artillery, honoured the camp last summer with his presence. The knowledge to be gained there, of the effect of artillery fire, of the modifying effect of ground upon the effect of that fire, and of the tactical principles to be learnt therefrom, the General above referred to would tell you, is of the highest importance to every Officer in the Army, whether he be a commander or leader of men in the field. Every Officer who has completed his course at the Staff College should be ordered to Okehampton instead of to Aldershot to learn artillery work. No Officer who has a chance of becoming a commander of troops will in these days be fit for such an important post who (as the lecturer has well said) has not thoroughly mastered the technical and tactical value of each arm, whether it be a field-gun, Maxim gun, quick-firing gun, or rifle; for his gauge of the effect of fire of each of these arms creates in his own mind the principles on which he is to base his tactics, and if his ideas are theoretical on this subject, his tactics will also be theoretical, and will result in an unnecessary sacrifice of the lives of his own men. There is only one way of acquiring the above most indispensable knowledge, and that is to go and see these guns fired, and to note their destructive effects. There seems to be present in the minds of some that the field-gun may be supplanted by one of the new arms, such as a Maxim gun or small calibre quick-firing gun. Now I am not one of those who think that either of them can take the place of the other. We want them all, and as many of them as possible. They each have an independent rôle to play, and it is our business to find out by actual practice what that rôle is, so that we may intelligently combine their forces together to the best advantage, under different phases of the fight. If it comes to a comparison between the value of the Maxim machine-gun and the 12-pounder field-gun, as an engine of war, there is no question in my own mind that the field-gun has the palm. The field-gun, with its shrapnel containing 177 bullets, its case containing 216 or more bullets, its common shell and fragments, can create against troops in the open as deadly a danger zone of bullets at 4,000 yards as the Maxim gun can at 1,500 or 2,000, if the effect of its fire can be observed, and it can attack troops behind cover with effect with its shrapnel and common shell which the machine-gun cannot; and at close ranges it can fire its case with 216 bullets with deadly effect up to 300 yards. How often has it happened that the infantry could not penetrate into a village or house till the artillery had come up to their assistance. With a view to convincing any unbelievers in the value of artillery fire, I would remind them that when a shrapnel is burst at the proper distance from troops in the open, the cone of dispersion of shrapnel containing 177 bullets creates a danger zone on level ground of 440 yards long by 26 yards broad at 1,000 yards; of 330 yards long by 20 yards broad at 2,000 yards; and of 160 yards long by 13 yards broad at 4,000 yards, and that, contrary to the machine-gun fire, the fire

of the danger zone is more intense at the longer ranges than at the shorter range, because the 177 bullets of the shrapnel fall into a smaller space. No, gentlemen, artillery fire is no joke in these days. The hole made by a shot is no longer the safest place to put your head into in these days on land. I do not know whether this practice still obtains in the Navy. The 12-pounder shoots like a rifle, and, in fact, shoots where it is laid. You won't believe me, perhaps, when I tell you that you can hit a gun in about three shots at 3,000 yards, and that shots frequently go through the same hole. With the slow-firing howitzer, I have myself seen at Shoeburyness three shots go through the same hole at 2,400 yards, and if that can be done with a howitzer, the slow travelling shot of which is more influenced of course by the air than that of a high velocity 12-pounder gun, then it can easily be done by the high velocity 12-pounder. There is another point which General Owen mentioned with reference to a battery first coming into action, and then finding the range. I think so highly of the effect of artillery fire, that I do not believe a battery could come into action against another battery already in action without being annihilated; and, therefore, I think it is absolutely necessary that the ranges should be found first of all by range-finder, or by a section of guns, and the sights adjusted under cover, the gun loaded and the fuze set, before going into action. Of course there are difficulties at present about having the gun loaded, but I believe that it could easily be got over with a little thought; also you want the fuze to be in the base of the shell which can be altered after the gun has been loaded. There is another point, that is with reference to the lecturer's remarks on the value which Lord Wolseley is said to put on artillery. I venture to think that his lordship's impressions on that point were very similar to those held by a large number of artillery Officers themselves, previous to the important improvements which have recently been introduced into the training of the Officers and men in shooting, and I am sure no one in England would be more pleased than his lordship to learn that the artillery fire had so much improved, and that the artillery intends to maintain the proud position for efficiency which it has always held in the British Army. Perhaps you are not aware that it was entirely due to Lord Wolseley's influence that the sights which General Owen has been good enough to refer to in his lecture were tried by batteries of field artillery, and if they have met with your approval, it is his lordship that you have to thank for their introduction into the Service.

Major HUTTON, King's Royal Rifles: My remarks made at Aldershot, to which General Owen has alluded, were intended to convey the idea, and, I think, they did in the discussion which followed the lecture, that the machine-gun which we have had an opportunity of testing up to the present moment is not a perfect weapon, and not that machine-guns are not extremely valuable adjuncts to an army in the field. The experiments conducted at Aldershot under the superintendence of Major Meham, to whom Mr. Nordenfelt referred, were conducted with very great care, and, as far as possible, under service conditions, and the result certainly surprised every one. General Owen has alluded in his lecture to the result of the experimental practice which then took place. The reason that the shooting was so bad we considered to arise from the fact that the sights and mechanism of the guns under trial were defective. The question of the principle of the employment of machine-guns with troops did not come into the question at all, but as practical soldiers we considered that the machine-gun submitted for trial was not a perfect one. I do not think there can be any differences of opinion as to the extreme value of the machine-guns in war, firstly, at short ranges, and, secondly, at long ranges. It is simply a question whether at long ranges the machine-gun is a sufficiently perfect and finished weapon for its purpose. I venture to think that at the present moment it is not so. Some very remarkable experiments took place at Aldershot the other day, which illustrated or brought home to us one of the manifest defects of the machine-gun at long ranges. The new magazine rifle was fired at 2,500 yards by a party of ninety infantry soldiers at a vertical and horizontal target with the most extraordinarily successful results. The target was not seen by the men at the firing point, as it was a very foggy day, but they directed their aim at an intermediate point at 1,000 yards distance, but here lies the secret of the successful shooting; the direction of every volley, and the mistakes

made in the aim, were made known accurately at the firing point by means of the telegraph, and therefore the necessary readjustment of sights was made, and thus it was that the shooting was so extremely accurate. Bear in mind that with a machine-gun you have no means of seeing where the bullets strike, and therefore unless you have a very carefully contrived range-finder, your machine-gun may be pumping lead and exhausting the ammunition limbers to no purpose whatever. Again, the laying of the gun and the sighting must be of the most perfect and complete kind if useful practice is to be reckoned upon at long ranges.

Lieutenant-General Sir ROBERT HUME: I wish as an old infantry Officer to say a few words to tell General Owen how exceedingly interested I have been in his lecture, and also because I do not think any infantry Officers have spoken this evening. The subject of the lecture is of the greatest interest to us, more so perhaps than to artillery Officers, who naturally know so much more about the subject than we do, but it is certainly of quite as much as great interest to us as it can be to them. I have never in the course of my service heard so many observations made in, I may say, depreciation of the artillery as I have heard this evening, I mean that the opinion seems to be pretty general that in other branches of the Service the artillery is not appreciated. But that is not at all the fact. There is no branch of the Service that any of us, I think, are more proud of altogether than our artillery, and I am perfectly certain that any of us, either infantrymen or cavalrymen, would be very sorry indeed to have to depend upon ourselves and to be left without artillery. As for the moral effect of artillery, I do not think, so long as the artillery produces the effect that we wish it to do, that it matters whether it is moral or whether it is actual. I do not know whether there are any other Officers in the room who can remember one instance of the very overwhelming effect of artillery that we saw in the Crimea, I mean at the Alma, when we were going up the hill. There were three shells fired from Turner's battery into what seemed to us an enormous mass of Russians who were coming down the hill, but the effect of those three shells dropped into this mass, whether it was moral or whether it was actual I do not know, was that the mass moved up the hill, and the effect on our men was that they went faster up the hill after that mass than they had done before. That happened when I was a young subaltern, and of course a few things of that sort in the way of practice have a very great effect on one's mind. I know that any of us who served out there, and actually saw the effect, and felt the effect of artillery, have never doubted the value of artillery since those days, and we teach, as far as we can, our men of different branches of the Service what they are to expect from the assistance and also from the opposition of artillery. With reference to what the lecturer said as regards Officers as far as possible being instructed or going down to see experiments with artillery at Shoeburyness or wherever they may be, I think that the different branches of the Service should, as far as possible, whenever opportunity offers, be made acquainted with the arms and with the training of the other branches. In India, where I served a long time, we have many of those opportunities which you cannot have in England, because we are able to carry out our own artillery practice, and our rifle practice near our large stations where any man, it does not matter whether he be a General Officer or one of the privates, infantry or cavalry, can go to the range, and many do go to the range, and see the effect of the practice. With regard to another observation made about artillery Officers making a mystery of their guns, and what they have to do, I can only say in my experience, and I have had a good deal, I have never seen it. I have found the greatest anxiety, not only to show everybody what they have to do, but to get men of other branches of the Service to go and see what they are doing, and the greatest pride taken in showing what they can do. I am delighted to hear all that has been said to-day about the progress the artillery is making, because so much depends upon it, and I feel personally very much obliged to the lecturer for the lecture he has given us, and the opportunity of the discussion. To many of us who are not actively employed, this Institution is the only place where we can hear these subjects properly discussed.

Captain F. E. D. ACLAND: I shall not detain the meeting for more than a few moments, but as an old Shoeburyness Officer, and having spent over four years in experimental work, I should like to say a word or two in regard to what General

Owen said. Firstly as to firing guns on what I think he called "perfectly level ground." As an experimentalist, I am convinced that it is the only way to arrive at any true results whatever with machine-guns or other artillery matériel; and to arrive at any reliable conclusion as to the comparative accuracy of any weapon, every outside cause of possible inaccuracy must first be carefully eliminated. After the weapons have passed through the experimental stage they should of course be handed over to the troops to experiment with them in what is technically known as "under service conditions." I know what an experiment under service conditions means, because I have carried out many in that way myself; but I fear that it often means that insufficient care for details is bestowed on it, and, even if the care is given, the Officer who has charge of the experiment does not fully grasp all those points of detail which are matters of ordinary routine to a man with a regular experimental training. For instance, Major Hutton has just fallen into a trap, in which I must catch him. He has told you that with the new rifle and the new ammunition they fired with most wonderful results at 2,500 yards, and that they had the effect of their fire and so on telegraphed down to the firing point, and then immediately, in the next sentence, he says that with the machine-gun you cannot see the result of your fire, and so how can you expect to get effective shooting at these long ranges? The logical conclusion would be to put the machine-gun on a footing similar to the rifle, and establish the telegraph, and then you have a fair comparison between the two. After an enormous amount of trouble in various quarters they have at last arrived at an ammunition for the new rifle, but as far as I know there is no machine-gun built at the present moment which has ever fired that ammunition. If you want to compare your rifle and machine-gun fire, put them on an equal footing in this respect and fire similar ammunition, and so see which is the most accurate. I must also go back to a remark made by Mr. Nordenfelt as to the experimental establishments of this country. Since I have left the Service it has been my privilege to see the experimental departments of two of the larger European countries, Austria and Russia. I had always, as a true Britisher, expected to find Russia a benighted country, but I must own, to my shame, that though I found the Officers less well educated and less well up in what one might call European gunnery, yet their experimental establishment was certainly double if not treble as good as our own at Shoeburyness. Their instruments were perfect, and if money was wanted and the experimental Officers said that they must have certain things they seemed to get them. The experiments were carried out by a staff of sailors and soldiers, not of soldiers only for naval experiments, but of soldiers and sailors, each doing their own proper work, and doing it in a way which was a source of astonishment to me. In Austria it is much the same thing: each have their own experimental ranges and establishments. Now I am perfectly intimate with all the details of Shoeburyness work, and I say it is monstrous that in this country, with all its wealth, we should be left with one questionably complete experimental establishment, inferior, as far as I can judge from a week's visit to one place and a fortnight to the other, in almost every respect to those in Austria and in Russia.¹

General OWEN: I shall trouble you with very few remarks in reply. The object of the lecture was to elicit information from others rather than to attempt to instruct anybody here. I wanted to hear the observations of those interested in the various points raised. Colonel Markham said that my paper dealt rather with the history than the value of field artillery, but I think the discussion we have had will hardly bear out that criticism. I saw Mr. Nordenfelt the other day, and he was good enough to tell me there was an 8-pounder besides the 6-pounder. If it is an 8-pounder so much the better; but I understood Mr. Nordenfelt to recommend the 6-pounder. Colonel Markham said that I had not pointed out the best places for limbers and wagons in action, but it might be inferred

¹ I am perfectly well aware of the experimental establishment connected with the "Excellent," but it must from local disadvantages remain lamentably deficient in all that can make it a satisfactory place for scientific research into general gunnery questions, which is vital to the correct solution of those many problems connected with matériel before it is introduced into the Naval Service.

from what I did say, that these should be in rear of the intervals between the guns, out of sight, and under cover when possible. As to the introduction of field howitzers and taking steps to avoid the necessity of turning fifteen field batteries into ammunition columns, I shall be extremely glad to hear if both can be accomplished; but the 20-pounder lately tried at Okehampton is not a howitzer in any way. The guns supplied for the reserve forces are very useful, but they are mostly position guns, which would in no way be able to take the place of field-guns. It is not necessary for me to answer what Colonel Hale said; Captain Saltmarsh replied very effectively. I do not think there is much doubt that buildings or strong masonry of any kind would be damaged very considerably by our guns. Colonel Maurice put very ably the contention respecting the moral effect of artillery, but I cannot at all agree with him that the moral effect is *out of all proportion* to the actual effect. However, it is not worth while saying anything more about that point, but I may say this: Colonel Home's book on "Tactics," although written a long time ago, is still used. Then again with regard to Lord Wolseley's "Pocket Book,"—I did not quote the edition he published twenty years ago, but the eighth edition. Sir Gerald Graham took exception to what I said about continuously—continuously fired from the same position without recoil. What I say is, you cannot fire a gun continuously that you have to lay between the rounds; you cannot fire a hundred rounds continuously if you have to lay your gun between each round. I am not speaking of the Maxim but the quick-firing guns, and I understood, both from the Armstrong firm and from Mr. Nordenfelt, that the firing of each round put out the laying to a certain extent; that although the recoil carriage prevented any running back, and there was only a slight motion, still there was sufficient to put out the laying.

MR. NORDENFELT: The vibration of the weapon is sufficient to disturb the aim at 2,000 or 3,000 yards; therefore they should always be relaid. But the relaying is done by wheels, and we still fire from fifteen to eighteen rounds comfortably per minute by relaying each round.

General OWEN: I am glad to hear that so much can be done.

Captain F. E. D. ACLAND: Twelve aimed rounds per minute is the condition the Government laid down, so that you can lay twelve rounds a minute.

General OWEN: Captain Stone said the reason for having the bursting charge of shrapnel in the head was that it enabled the shell to be fired with a percussion fuze. I am not quite sure I understood him, but if that is the case, it is an advantage, of course; still I cannot think that the shell is altogether satisfactory, and when I wrote to Colonel Barlow, R.A., Superintendent of the Royal Laboratory, to ask the reason, he replied, "Having the bursting charge in the head leaves room for more bullets."

Captain STONE: I said that putting the charge in the head enabled the bursting charge to be ignited with greater rapidity than when it was in the base, and that therefore percussion shrapnel would take effect under the new conditions with great results up to 2,000 yards; whereas in the old condition, that is, when the fuze took so long to ignite the bursting charge, owing to the latter being in the base, the bullets went up in the air instead of travelling forward. This is due to the fact that in the former case, the burst is almost instantaneous upon impact, and actually takes place at the moment when the effect of the ricochet has brought the axis of the shell into a horizontal position, or with its point perhaps just on the rise from that position; the axis of the cone of dispersion is consequently horizontal or slightly inclined upwards, thus giving great effect to the bullets. In the latter case, however, the action of ricochet is completed before the burst has time to take place, the result being that the axis of the cone of dispersion is deflected upwards to such an extent, that there is practically a safety zone of 50 to 100 yards immediately in front of the point of impact, most of the bullets falling harmlessly over the object aimed at.

General OWEN: Mr. Nordenfelt said the powder they used would make very little noise and no smoke, but a kind of haze, which would be rather an obstruction in the way of those aiming from a distance. That of course is an advantage, and I referred to it in my paper. As to my alluding to a fallacious comparison in counting the amount of metal fired from two guns, I say this, if you have a

6-pounder shell fired against a 12-pounder shell, for instance, the smaller shell, I should imagine, would fire too close, and the cone of dispersion would not be of the same extent. You may fire the same weight, but you would not cover the same ground—that is my meaning. I do not think it is necessary to detain you any longer.

The CHAIRMAN (Sir Lintorn Simmons): I think you will all agree with me, in fact all the speakers hitherto have expressed their opinions that they have been much gratified by the lecture we have just heard from General Owen. It has brought sundry subjects under our notice which are of great interest to the Services. They are so numerous that it will not be possible for me to touch upon many of them, but there are one or two as to which I will make a few observations. The lecturer in the first instance began by combating a statement by Lord Wolseley, that the effect of artillery is more moral than actual, and that it kills but few. I have heard a great deal about moral effects as distinguished from actual effects, but my belief is that the moral follows the actual results, and that noise will not frighten properly organized troops, such as an army might be likely to meet in Europe, but that they are effected solely and wholly by the results that are to be seen among them. There is a certain effect of noise which gives confidence to troops, as when their own artillery is heard in their vicinity, because it assures them that they are supported on their flank, where they know that destructive results are being produced upon the enemy. The effect of the noise of artillery in the field is not like that produced upon a household when a burglar is in the house, who may be suspected of having a revolver in his pocket. Individuals are liable to alarms of that sort, but I do not believe that large masses of men, if well trained, well organized, and subject to discipline, can be affected in that way. What really brings crushing effects in war is when troops having been weakened by disease, by heavy marches, by want of food, or by previous disasters, find they are suffering heavy losses; great moral effects are then produced, and when so fatigued and worn out that they are unable to maintain their ground. These, I believe, are the principal causes why troops retire from the field of battle; but I do not believe in the moral effect of noise at all. The question of quick-firing guns is one of the greatest possible interest. I heard Captain Acland remark that the conditions fixed by the Government for quick-firing guns were that they should be able to fire twelve laid rounds in a minute. That is, I presume, for sea service; and I can perfectly understand such to be the case, because at sea guns are fixed upon standards when they do not recoil at all, which is not the condition of guns which must be subject to recoil or shock when fired in the field. I take it the conditions are quite different. Having seen practice on board ship, I have not the slightest doubt that these guns can be fired twelve rounds in a minute, the gun being in a fixed stable position, and the man who lays the gun never removing his shoulder from its butt.

Captain ACLAND: If the field-gun does not recoil, surely the guns are in the same condition as those on board ship?

The CHAIRMAN: But in the field the gun is not fired from a fixed platform.

Captain ACLAND: The gun will not recoil.

The CHAIRMAN: On board ship the gun is absolutely fixed, and the platform to which the gun is attached is fixed; whereas in the field there must be a certain amount of motion from the shock on the ground. I have not seen these guns at work in the field, but I cannot understand that there is no motion whatever on the ground.

Mr. NORDENFELT: We have often fired eighteen rounds from a field carriage—often.

The CHAIRMAN: Laid?

Mr. NORDENFELT: Yes, often.

The CHAIRMAN: I am glad to hear it, but I do not understand it, I must say, that is, if the gun be carefully laid after each round. Then as to the effect of shrapnel in the field. I have not seen any of these new pattern shrapnel with bursting charges in their head, but having been on the Armstrong and Whitworth Committee, which is now perhaps almost too out of date to allude to, I know that shrapnel shells of those days, as fitted by General Boxer, had the charges in the

base of the shell, and that a great number of rounds were fired direct at walls 18 or 20 inches thick, and against earthworks, when we found that the shells with those percussion fuzes exploded immediately behind the obstacle, as they came out of it, within a couple of feet or so. The results, as recorded, show that they would have had the most destructive effect upon men inside the walls. In order to test the action of the fuzes, which was very quick, shells were fired against targets of wood 2 inches thick, after passing through which, they burst about 15 feet behind them, at least that was the conclusion that was arrived at after a number of experiments carefully conducted. That seems a very quick explosion, and certainly the bullets were not impeded by it, which they must be, more or less, by the explosion of the charge in the head of the shell. I have no further observations to make. These have occurred to me within the last few minutes, and I now ask you to pass a vote of thanks to General Owen for his exceedingly interesting lecture.

Friday, February 15, 1889.

ADMIRAL SIR EDWARD G. FANSHAWE, G.C.B., Vice-President,
in the Chair.

THE MORE RECENT IMPROVEMENTS IN THE THORNYCROFT TORPEDO-BOATS.

By JOHN DONALDSON, M. Inst. C.E.

IN the early days of torpedo warfare the ordinary steam-launch, converted into a torpedo-boat by being fitted with a spar torpedo, formed a ready and, in the hands of men of enterprise and resource, a most efficient means of offence, and did considerable service in the American and Russo-Turkish wars, and more recently in the war between Chili and Peru. The speed of these boats was not great, yet, such was the panic produced on board the vessels attacked, that the casualties on board the boats were small as compared with the results obtained.

The tactics were those of surprise, in which speed was of less importance in the attack than in the subsequent escape, should the attack prove unsuccessful; and these tactics were continued after the advent of the fast torpedo-boat, which was considered simply as an improvement on the earlier steam-launch, and was armed with either the towing or the spar torpedo.

The towing torpedo was found unsuitable as an armament for the small fast vessels of that period, and soon gave place to the spar, with which weapon most of the vessels built by my firm previous to 1878 were armed.

The introduction of the machine-gun as an armament for ironclads, however, rendered the immediate neighbourhood of one of these vessels almost if not quite unapproachable, and many people thought and some said that the days of the fast torpedo-boat were numbered, and that anything which could be done by them could be done equally well by an ordinary steam-launch as in the days of yore.

This idea was brought very forcibly home to the professional mind by the remarkable diagrams illustrating Captain (now Admiral) Hopkins's report in 1880 on the competitive trials between Nordenfelt and Hotchkiss machine-guns, and showing the disastrous effect of employing these weapons against models of second-class torpedo-boats.

The non-professional mind was greatly assisted in the same direc-

tion by a picture which I understand the late Mr. Hotchkiss had painted about that time, showing the repulse by a French ironclad armed with Hotchkiss guns of a number of torpedo-boats which had attacked her (Plate 4).

A photograph of this picture is on the table.

With the introduction of the Whitehead torpedo as an armament the future of the torpedo-boat seemed to take a fresh departure, it being no longer necessary to go close up to the vessel attacked, from three to four hundred yards being considered near enough for successful practice, and large numbers of vessels fitted with the means of discharging this weapon were ordered by the various Governments, the smaller vessels designated by the English Admiralty second-class boats being fitted with various devices, such as side frames, dropping gear, steam impulse gear, and, ultimately, ejecting tubes suited for air impulse, and the larger, or first-class boats, being fitted with air impulse ejecting tubes.

The earlier first-class boats built for the English Admiralty had a single swivelling tube on the forward deck, and the torpedo could be fired without stopping the way of the vessel, a matter of great importance in combating the machine-guns, and it is noteworthy that England was the first to adopt the swivelling gun, which in various forms is now being adopted abroad.

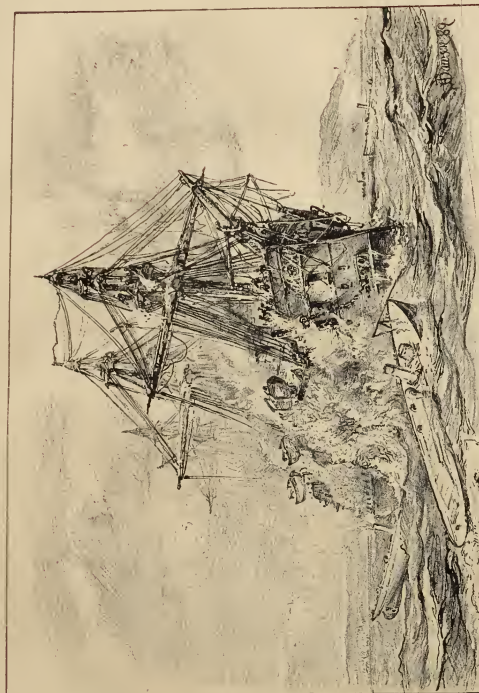
The models A and B on the table represent the typical boats of the English Navy in 1881, when I last had the honour of lecturing in this room, A being a first-class boat of the period with its swivelling tube forward and reserve torpedoes in carriages amidships, and B being a second-class boat with torpedoes in side frames, one ready for discharging and the other in the stowed position.

The immense advance which has been made in these boats is shown by the models C and D, the former of which represents a first-class boat recently designed by us to suit the Admiralty requirements and to embody all our most recent improvements, and the latter a second-class boat, designed under similar conditions.

With the exception of the very early vessels built by us in which the propeller was abaft the rudder, our torpedo-boats previous to 1886 were, as a rule, fitted like ordinary vessels with the rudder abaft the propeller, and depended for their steering going astern, and a certain amount of increase of turning power going ahead, upon balanced rudders placed forward, which were so arranged that they might be raised or lowered at the discretion of the commander, and if necessity required might be dropped altogether.

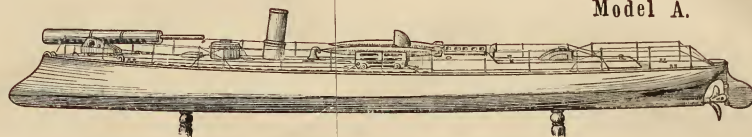
The rudders forward were not by any means satisfactory, although they increased the manœuvring power of the boats, partly because the arrangements for working them simultaneously with the after-rudder were somewhat complicated, and partly because they so readily caught up floating obstructions such as nets, ropes, &c. On the second-class boats they were somewhat dangerous if suddenly put over when the boat was rolling in a sea-way, and were discontinued in these boats on that account.

In 1886 we completed two small boats for the Admiralty, numbered

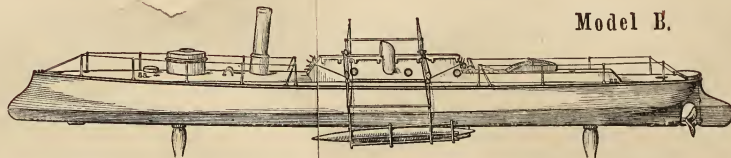


FRENCH IRONCLAD ATTACKED BY TORPEDO BOATS.

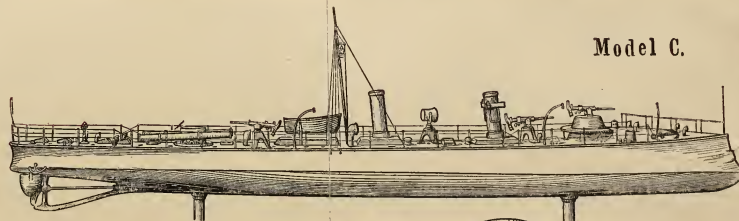
Model A.



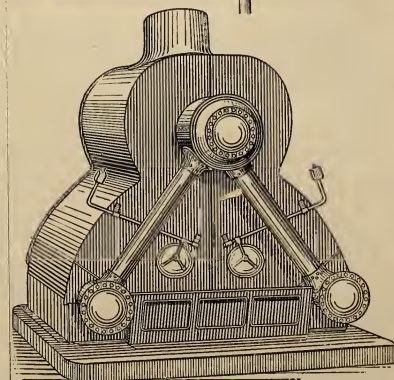
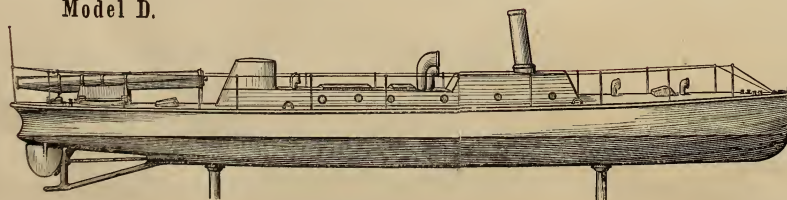
Model B.



Model C.

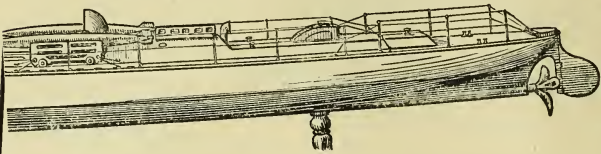


Model D.

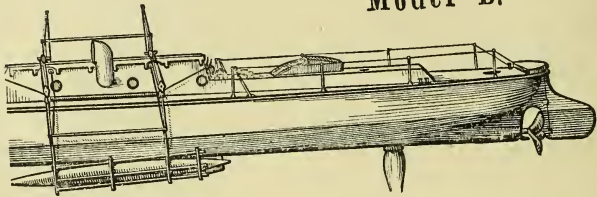


MODEL OF THORNYCROFT BOILER.

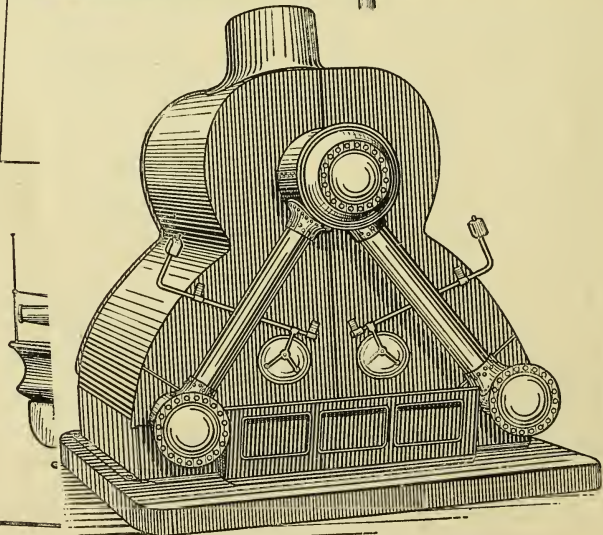
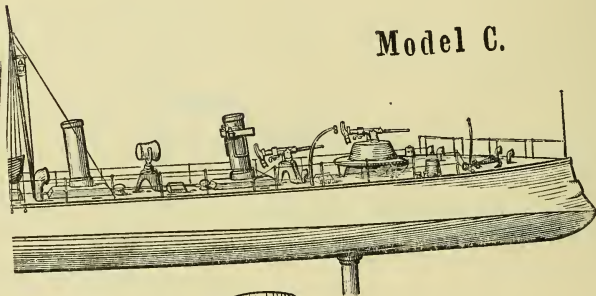
Model A.



Model B.



Model C.



MODEL OF THORNYCROFT BOILER.

respectively 99 and 100, second-class boats, in which the rudder question was completely solved by the adoption of our patent system of double rudders.

These rudders, as may be seen in Diagram No. 1 (Plate 5), which illustrates No. 100 second-class boat, and in model E which represents a design for a guard boat for submarine mines, are placed one on each side of the propeller, and, as may be readily imagined, cause the whole volume, or nearly the whole volume, of water from the propeller to be deflected to one side or the other, according to the position of the rudders and to the direction in which the engines are working, whether ahead or astern.

In order to decrease the lateral resistance and to secure as much as possible of the turning effect of the volume of water from the propeller, the dead wood is cut away as shown, a device probably as old as navigation, and together with the prototype of balanced rudder may be seen any day on board the large country boats on the Hooghly.

Like every invention of any value, the double rudders took a good deal of working out, but their value was so distinct in Nos. 99 and 100, that the twenty-five first-class boats ordered from us by the Admiralty were fitted in this way, as were all subsequent vessels to which the system was applicable. The stems of the rudders were fitted with quadrants into which screws, carried on a spindle between them, were geared. This spindle, in the case of second-class boats, had a pitch pulley fixed at one end to take a pitch chain worked from the steering wheel, and in the case of first-class boats was worked direct by means of a steam steering engine lying between the rudder stems.

Nos. 99 and 100 were of the same dimensions, viz., 64 feet in length by 8 feet beam, and drew 3 feet 7 inches of water. Both were fitted with "Whitehead" ejecting tubes in the bow, suited for powder impulse.

No. 99 had an ordinary locomotive boiler, and No. 100 had the "Thornycroft" patent tubulous boiler hereafter to be described, which, occupying less space, gave more room for the stowage of men with small-arms, a considerable space forward of the boiler, as may be seen from the diagram, in addition to the after-well being available for their accommodation.

The displacements of these vessels were as nearly as possible the same, viz., $13\frac{1}{2}$ tons, but the speed, owing to the extra horse-power obtained through the employment of the patent tubulous boiler, differed considerably, being 16.13 knots in the case of No. 99, and 16.8 knots in the case of No. 100.

Both boats showed a marked superiority over the ordinary second-class boats in manœuvring power, the circles being completed in an average of 44 seconds to starboard and $46\frac{1}{2}$ seconds to port, with a diameter of 49 yards, while the ordinary second-class boats took $85\frac{1}{2}$ seconds to starboard and 60 seconds to port, with a diameter of circle of 94 yards.

A very remarkable feature of these turning experiments was the

fact that in going astern the circles were completed in less time than when going ahead, viz., $43\frac{1}{2}$ seconds to starboard and 40 seconds to port, results which will be appreciated by Officers engaged in handling these fast boats, as with the facility with which the engines can be stopped and started, almost anything can be done in the way of manœuvring by a man with a little experience and a clear head.

With regard to the other improvement with which these boats were fitted, viz., the tubulous boiler, I may say that previous to 1860 my partner, Mr. Thornycroft, had gone thoroughly into the boiler question, and had thought out everything that was possible in the way of compact, light, and powerful boilers, and in his first fast steam-launch, the "Ariel," built in 1863, had adopted the locomotive type as that most likely to meet all the requirements of a fast steam-launch.

This was the boiler of the "Miranda," and of all fast boats built by us, whether for torpedo-boats or for the fast pleasure launches on which the reputation of my firm was originally founded, and I think I may fairly claim that we were the first to use the locomotive boiler as a marine boiler.

As time went on, however, and greater demands were made for steam, without any possible concession in the way of weight, which, be it remembered, had all to be floated, the locomotive boiler with its straight tubes and tube joints in close proximity to a fierce fire showed signs of distress.

Tubes leaked, and that persistently, priming occurred to an extent that frequently baffled all our efforts to continue a trial, and in a way that was most puzzling. Sometimes we could run with a high wind pressure, such as in some boats which I delivered to the French Government at Cherbourg, in which we used a pressure equal to 10 inches of water, and at other times we could not use 2 or 3 inches without priming.

Skill also in the working of the boilers was a great consideration, and an experienced stoker made a wonderful difference in a trial trip, not only in the keeping of steam, but in ensuring that the ordinary difficulties might not be greatly enhanced by the addition of a boiler explosion.

I am thankful to say that in our own hands no such explosion has ever occurred, but I regret to have to add that after some boats left our hands the nearest approach to an explosion which the design and construction of the boilers admitted had taken place, through the ignorance of the people working the boilers, with most disastrous effect.

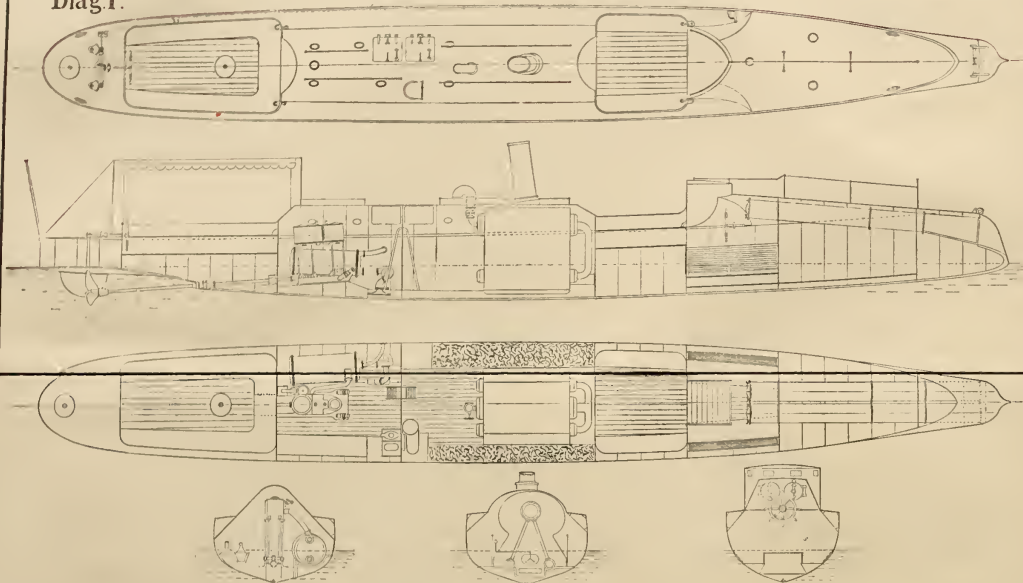
Many attempts have been made to produce high pressure steam in tubulous boilers, that is to say, in boilers in which the water is inside the tubes in contradistinction to those in which the water is outside the tubes, notably in the case of the "Perkins" boiler, and more recently in that of the "Herreschoff" and "Du Temple" boilers.

The "Perkins" boiler has not been tried in a torpedo-boat, but the "Herreschoff" has, both in this country and in America.

The results in this country were to a certain extent satisfactory, but

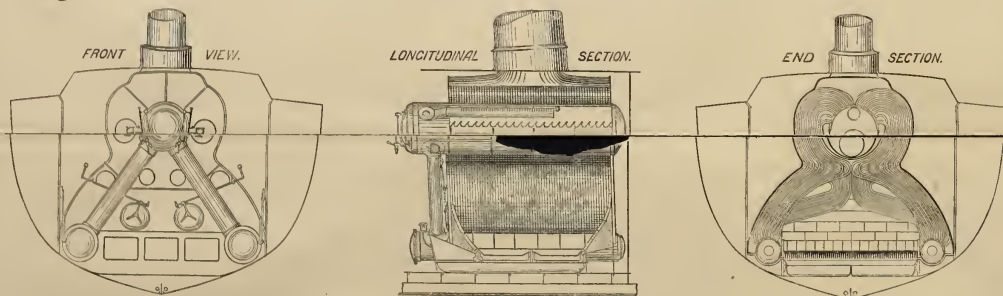
Diag 1.

2ND CLASS TORPEDO BOAT FOR THE ENGLISH GOVERNMENT.

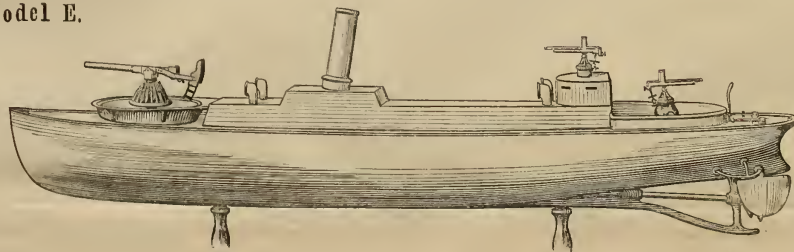


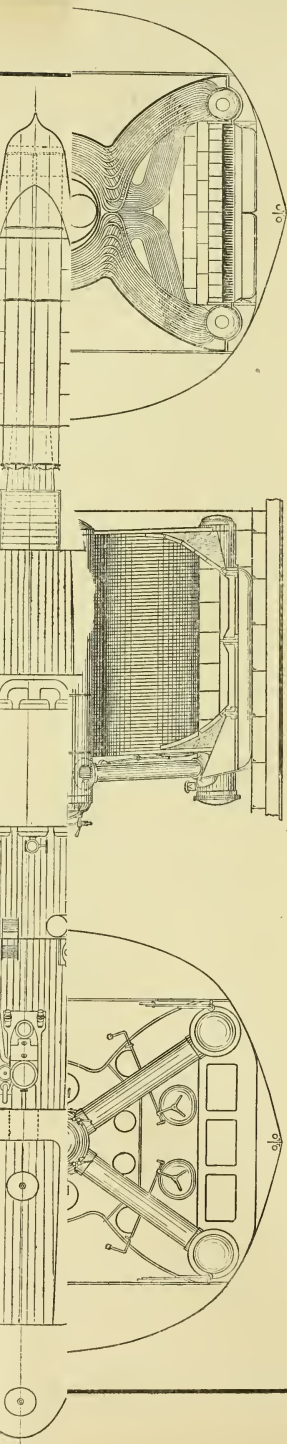
Diag 2.

THORNYCROFT PATENT WATER TUBE BOILER.

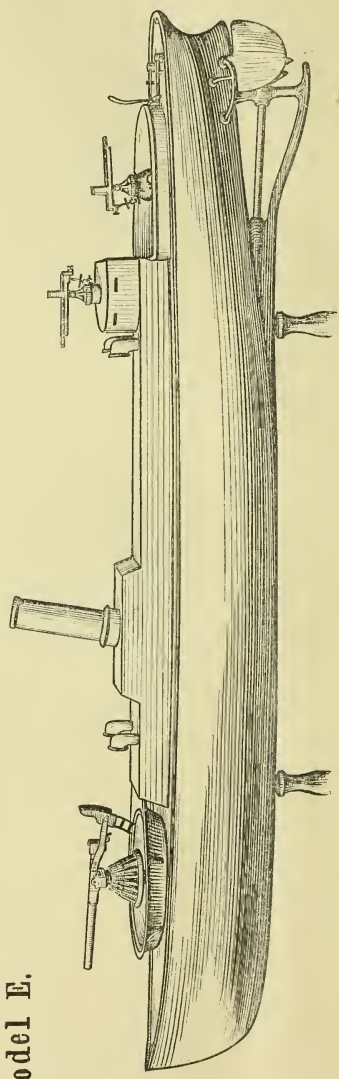


Model E.





Model E.



it is noteworthy that since 1883, when the last boats fitted in this way were delivered to the Admiralty, no others have been ordered. They are still manufactured in America, however, by the Messrs. Herschhoff.

The "Du Temple" boiler has been used a good deal in France for steam-launches, and latterly, I believe, for torpedo-boats.

At first sight it appears to be not unlike the "Thornycroft" boiler in its leading particulars, so much so that its inventor, M. Du Temple, considers the "Thornycroft" boiler to be simply a piracy of his invention, and nothing apparently will persuade him to the contrary. The points of difference, however, are clear, and are just those which contribute to the success of the "Thornycroft" boiler as a torpedo-boat boiler.

The first "Thornycroft" boiler was fitted to the steamer "Peace," built by us for the Baptist Missionary Society in 1883, for service on the Congo.

It was the result of much careful experiment, and although well adapted for the particular service for which it was designed, was in many ways not quite suited for torpedo-boat work.

Its lasting properties, however, have had a five years' test, and on the 18th of September last, Mr. Grenfell, the missionary in charge of the boat, reports as follows:—

"The boiler itself is doing splendidly, and we have no difficulty in keeping up steam sufficient for 400 revolutions—in fact, quite steam enough for any purpose, and when head to wind often too much."

The torpedo-boat type of tubulous boiler is shown on Diagram No. 2, but is perhaps best illustrated by the model on the table.

It will be seen to consist simply of three cylinders lying parallel to each other, the two smaller being at the base of the structure, and the larger one at the top.

These cylinders are rigidly connected by means of two large tubes at the fire-door end, by which the water returns from the upper to the lower cylinders by two stays at the outer end, and by the lower cylinders being firmly fixed to the seatings attached to the floors of the boat.

A further connection exists between the top and bottom cylinders in the great multitude of small tubes curiously but methodically contorted, the ends of which are firmly fixed in the top halves of the lower and upper cylinders.

These are the steam generating tubes, and are perfectly free to move under the influence of expansion or contraction caused by differences of temperature or of pressure.

On looking carefully it will be noticed that the inner row of tubes forming what would be the crown of the fire-box, and the outer row forming what would be the shell in an ordinary boiler, are, by means of a very simple alternation of their ends, made to lie quite close together, so that none of the products of combustion can pass between them. The lower part of the upper cylinder is thus protected from the direct action of the heat, and none of the products of combustion can reach the outer casing.

The tubes are fixed in the cylinders by expanding in the ordinary way, and an outer casing of thin steel covers the whole.

In the upper half of the upper cylinder a curved baffle-plate with serrated edges is fixed to protect the steam pipe and allow of the quiet separation of the water and steam.

The fire-bars are disposed at the base of the boiler, and between the two lower cylinders, and have a fire-brick framework all round them, the end portions of which protect the outer casings where there are no tubes, and the side portions act as protectors to the lower cylinders, and as bridges over which the flame must pass on its way to the chimney.

When steam is required the boiler is filled with water up to the middle of the upper cylinder, and the fire is lighted.

The products of combustion pass over the side bridges and through the spaces between the lower ends of the generating tubes into the spaces between the tubes and along them to the upper half of the upper cylinder, whence they are drawn off to the chimney.

In addition to the heat absorbed from the gases a great amount of radiated heat is received by the tubes forming the crown of the furnace.

As may readily be imagined, in consequence of this large access of heat, the whole of the water and steam in the generating tubes is ejected violently into the upper cylinder and thrown on the top of the separator plate, whence the water is conducted gently to the water-level, the steam being drawn from the underside of the baffle-plate by means of a perforated internal pipe.

The water returns to the lower cylinders by means of the return tubes in front, thence to be drawn up as before through the steam generating tubes.

From this it will be seen that a most energetic circulation obtains in this boiler, and as the steam and water are both thrown into the upper cylinder the effect of a large water surface is obtained, and priming is completely obviated.

This circulation and the general action of the boiler are best illustrated by the small working model I have had made for this purpose.

The upper cylinder is represented by the open vessel on the top, the downcast tubes by the pipe leading from it to the lower vessel, and the generating tubes by the bent tubes with their upper orifices opening into the upper vessel.

On applying heat to the generating tubes the water and steam at once begin to boil over, the steam passing off, and the water returning along the return tubes to the lower vessel.

From the description of this boiler which I have given it will be seen :—

1st. That great structural rigidity is combined with ample elasticity in the tubes exposed to the action of the heat.

2nd. That no joints are exposed to the direct action of the fire.

3rd. That owing to the tubes forming the fire-box being close

together, a greater amount of surface exposed to the radiant heat of the fire is secured than usually obtains in a tubulous boiler.

4th. That from the tubes forming the outer surface being close together, no heat from the gases can come through, and the radiation from the boiler is only that due to the temperature of the steam.

5th. That on account of the great amount of heating surface and the small amount of forced draught required, the products of combustion have a very large proportion of the heat taken out of them, and no hot ashes or flames escape from the chimney, as is frequently the case with the locomotive boiler.

It has been urged against the boiler that as the generating tubes are very thin, they will be more readily destroyed by corrosion than the tubes of the locomotive boiler. This may be so if they are neglected, but if properly kept clean and dry I think there is little danger from this source.

Should a tube become leaky, it can be easily stopped at both ends by means of stoppers which we supply for this purpose, one of which is now on the table, and these stoppers, if once inserted, will become firmly fixed in their places, as the pressure will always be greater in the cylinders than in a leaky tube.

The loss of heating surface in one tube, or in even a dozen, is so small in proportion to the total surface, that no great loss of efficiency will be experienced if a good number be stopped up.

Should it be necessary to renew any of the tubes, there is no difficulty in doing so. All that is required is to remove a few of the surrounding tubes, an operation of no great difficulty, and one which we have done without removing the boiler from the boat on several occasions, when a defective tube has shown itself under the water test.

The work is done by means of a ratchet brace and the tool which I hold in my hand. This tool is inserted in the end of the tube so that the collar on the tool rests against the end of the tube, the ratchet brace is then applied, and the tube is gently but forcibly displaced, and the tubes are so little injured by this process that they may be replaced after the defective tube has been got at and remedied.

Since the component parts of the boiler are all of a moderate size and the tubes can be thus easily taken out and replaced, it follows that a ship fitted with these boilers could have them removed and refitted without disturbing armoured decks and other permanent parts of her structure.

Indeed it is a question whether a ship fitted with ordinary boilers could not have them cut out below and sent up in pieces, new tubulous boilers being sent down in pieces and put together.

There is this to be said on that question, however, that vessels fitted with ordinary boilers would probably have ordinary engines not fitted to deal economically with the higher pressures of steam for which these boilers are so well suited.

I find from our records that the missionary steamer "Peace" was completed towards the end of 1882, and tried on the Thames, was then taken to pieces, packed, and sent to the Congo.

On this occasion all the tubes were taken out of the boiler, as the weight of each package was, as far as possible, restricted to 64 lbs.

The vessel and its boiler were re-erected there by the missionary and his black assistants, and set to work in the spring of 1884, since which time it has been running with the success already mentioned.

No. 100 second-class torpedo-boat was running on the Thames early in 1886, and was delivered to the Admiralty in August of that year, so that the boiler has been in use altogether something like three years, and by the latest accounts was giving continued satisfaction.

These facts tell strongly in favour of the boiler, and their evidence is corroborated by a letter I have received from Captain Nielsen, Director of Naval Construction of the Royal Danish Navy, in which he says:—

“In the torpedo-boats ordered during the last two years from your firm for the Danish Navy, you will remember the boilers are of ‘Thornycroft’ patent tubulous type, thus two tubulous boilers have been fitted in each of the first-class torpedo-boats ‘Narhvalen,’ ‘Havhesten,’ ‘Storen,’ and ‘Soloven,’ and one boiler in each of the four second-class torpedo-boats and four patrol boats.

“These boilers have up to this date never given any trouble, steam can be put up in less than half an hour without risking leakage by sudden variation in temperature.

“They are splendid steam generators, the air pressure at full speed does not exceed 1 inch to $1\frac{1}{2}$ inch in the large boats.

“The engines can be stopped suddenly from full speed with heavy fires on without any consequent difficulty as to sudden rise in steam pressure, and, on the other hand, the steam pressure can be raised 100 lbs. in a few minutes, yet it has never happened that leakage at any tube or joint has appeared. The boiler is not liable to priming, and the water surface is not disturbed, or the heating surface uncovered by the rolling of the boat.

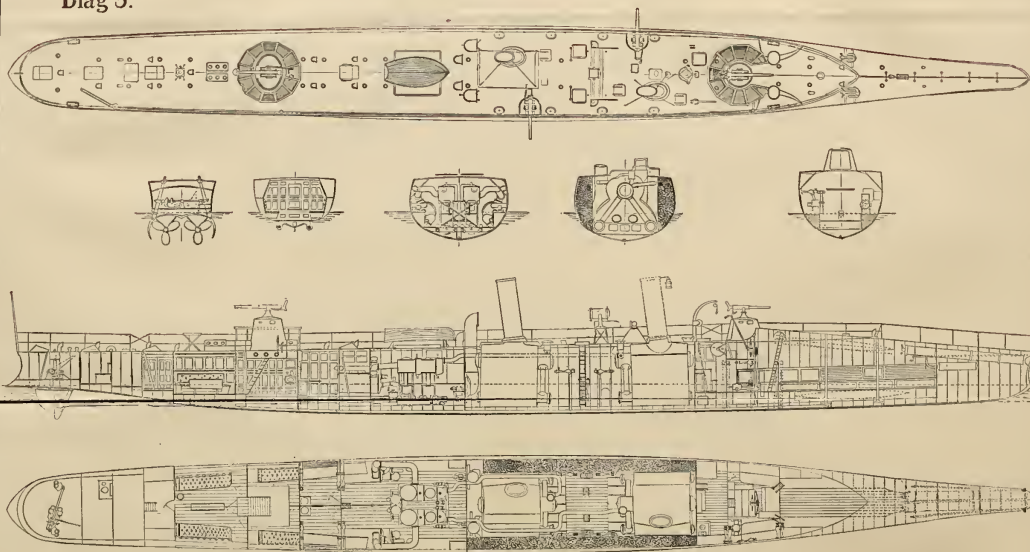
“Besides these advantages with regard to the general working and management on cruize, the tubulous boiler possesses other important advantages.

“Thus it is well adapted for high pressure, the boiler having no flat surfaces stays can be done away with. The combined weight of the boiler proper with its content of water is considerably less than is the case with the locomotive boiler.

“Considered as a war-ship, the advantages which a torpedo-boat with two tubulous boilers, each able to drive the boat at a high speed, possesses over a similar boat fitted with one large locomotive boiler are evident. Having a large and very effective heating surface, the boiler is very economical as to coal consumption, nearly all the heat developed by combustion is given off by the gases before they enter the funnel, and no unburned coal escapes from the funnel, which point speaks largely in favour of this boiler for torpedo-boats’ purposes. Our engineers are, in fact, so satisfied of their superiority over the locomotive boiler that we, without hesitation, fit these boilers in all new boats, and when locomotive boilers in older boats have to

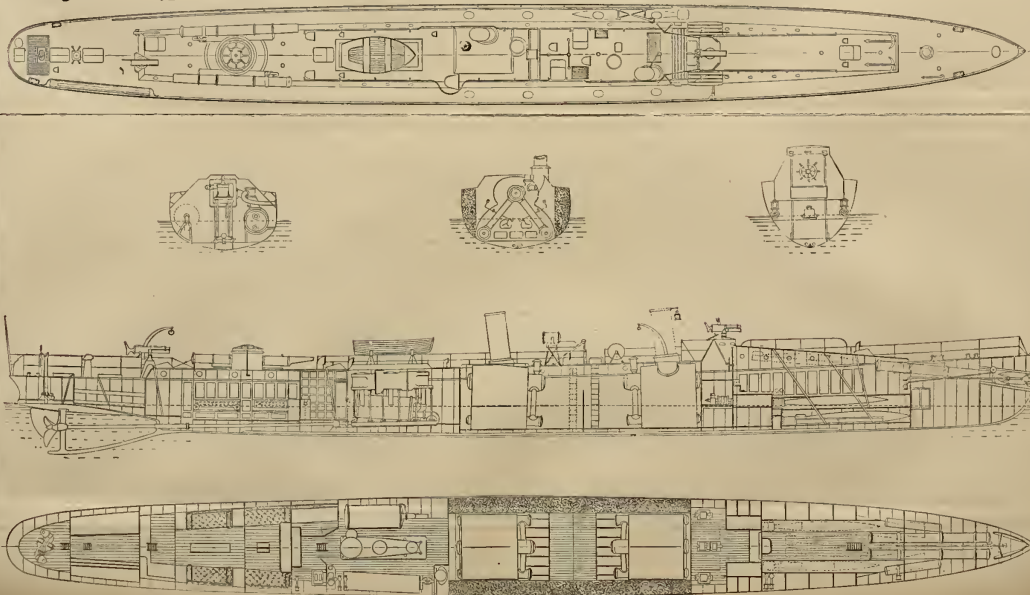
THE "ARIETE" FIRST CLASS TORPEDO BOAT.

Diag 3.



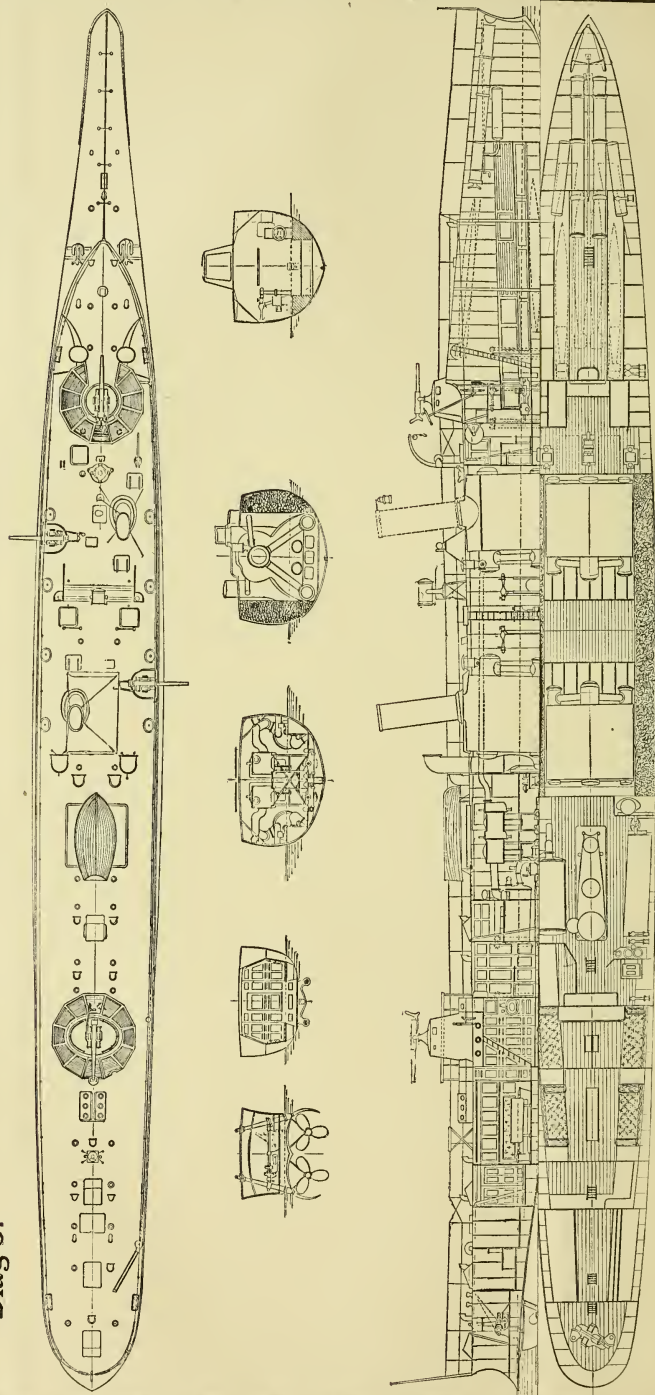
Diag 4

GENERAL ARRANGEMENT OF 1st CLASS TORPEDO BOAT FOR THE DANISH GOVERNMENT.



THE "ARIETE" FIRST CLASS TORPEDO BOAT.

Diag 3.



be taken out for repairs, we replace them with the tubulous boiler, as now done in the 'Delfinen.'"

I will now direct your attention to Diagram No. 3 (Plate 6), which represents the Spanish torpedo-vessels "Ariete" and "Rayo" and the French vessel "Coureur."

These vessels are 147 feet 6 inches long by 14 feet 6 inches beam, with a displacement of 98·75 tons on a draught of water of only 4 feet 11 inches.

In appearance they resemble somewhat the twenty-five first-class sea-going torpedo-boats built by us for the Admiralty in 1886.

The snouts, however, are wider, as they carry two torpedo-guns forward instead of one.

The general features of the accommodation are much the same as on all torpedo-boats, the crews being berthed forward in the torpedo-room and the Officers aft.

In the larger vessels the cabins are somewhat roomier, and in some cases advantage is taken of the increased space to provide separate sleeping cabins for the Officers.

This is the case in the "Ariete" type, as may be seen from the diagram, where two cabins are provided forward of the saloon for the Commander and his Lieutenant, and two abaft the engines for the engineers.

The great feature, however, in "Ariete" and in all our recent vessels fitted with double rudders is the great expanse of floor surface which is secured in the after cabins through the form of the stern. This is seen very clearly from the diagrams. The torpedo armament of these vessels consists, as previously mentioned, of two torpedo-tubes in the bow, and they have in addition four 3-pounder quick-firing guns, one on each turret and one on each side. Four torpedoes were carried, and in the case of "Coureur" 3 tons of gun ammunition.

Instead of being fitted in the usual way with one propeller only, "Ariete" and her sister ships had twin screws driven by ordinary compound engines which developed collectively about 1,550 I.H.P.

The boilers are our patent tubulous type worked up to 150 lbs. per square inch, one boiler supplying each engine with steam.

The guaranteed speeds in all these vessels were 25 knots on the measured mile and 24 knots on a run of two hours' duration.

On their official trials "Ariete" did 25·003 knots on the measured mile and 24·9 knots on the two hours' run, "Rayo" 25·52 knots on the measured mile and 24·63 knots on the two hours' run, while "Coureur," which was tried at Cherbourg, from some cause which I have been unable to discover, only did 23·5 knots on the measured mile and 23·6 knots on the two hours' run.

On her preliminary trials on the Thames, a speed of just over 26 knots was obtained with a load of 7·8 tons on board, a result which quite warranted us in expecting our guaranteed speed at Cherbourg, more especially as there was an ample supply of steam, and the engines would be freer in working after steaming all the way to Cherbourg.

I attribute the loss in speed to either the propellers not being

exactly the same as in "Ariete" and "Rayo," or to the rudders not being set to the correct angle, a matter of considerable importance with side rudders, or possibly to both causes combined.

The Minister of Marine declined to accede to our request for an additional delay to enable us to find out, remedy the defect, and have a fresh trial, as he was anxious to send the vessel from Cherbourg to Toulon in rough weather, so as thoroughly to test her sea-going qualities. He, however, allowed us to send our engineer Mr. Brown round in her to Toulon, and from his log we have got much valuable information as to her behaviour at sea.

One experience they had which I believe is not uncommon with an engine-room crew new to a ship, and that was the large consumption of coal as compared with the results obtained in our coal consumption trials.

Our contract in this respect was that the coal consumption should not exceed 85 kilogrammes of coal per hour at a speed of 10 knots, which is equivalent to 8.36 tons per 1,000 knots, and on the trials at Cherbourg, the exact amount required, as determined by a trial of six hours' duration, was $7\frac{1}{2}$ tons. The total distance run from Cherbourg to Toulon was 1,968 knots divided into three portions, viz., from Cherbourg to Brest, 205 knots; from Brest to Cadiz, 943 knots; and from Cadiz to Toulon, 820 knots.

During the first two stages the fuel consisted of Briquettes, and during the third stage common Welsh coal, procured at Cadiz, was used.

The stoking, at first indifferent, improved as the voyage progressed, the results being, that during the first stage 1 ton of Briquettes carried the ship 50.24 miles, which gives 19.82 tons per 1,000 miles; during the second stage, 54.2 miles, or 18.45 tons per 1,000 miles; while during the third stage, probably owing to the inferior quality of the fuel, 1 ton of the Welsh coal carried her only 44.07 miles, or 22.7 tons per 1,000 miles.

During the later stage the Commander ordered full speed for half-an-hour with one engine only, which gave a speed of $17\frac{1}{2}$ knots, a result which pleased him greatly, because, as he said, "the boat was at sea in sea-going trim and with her own crew."

On the voyage "Coureur" proved herself an excellent sea-boat, and the Commander, according to Mr. Brown, was loud in his praises of her manœuvring qualities.

Since the arrival of "Coureur" at Toulon we have received a letter from Admiral Krantz, Minister of Marine, which has given us much gratification, the translation of which is as follows:—

"I am pleased to acknowledge that from the reports which have come to me, the 'Coureur' appears to have given every satisfaction in respect of her sea-going qualities during her voyage from Cherbourg to Toulon. The working of her evaporative apparatus has been equally most satisfactory, notwithstanding that the utilization of the fuel may not have been maintained to the same advantage as it had been on the trials."

Diagram No. 4 illustrates a type of vessel of which we have built

two in the autumn of last year for the Government of Denmark. The dimensions are: length, 137 feet 10 inches; beam, 14 feet; draught of water, 7 feet. The general arrangement, with the exception perhaps of the cabin accommodation, differs considerably from that of "Coureur."

The stem is straight, or nearly so, above the water, and is continued by a large easy curve to the keel, while the bows are considerably flared out, the object being to give an easy entrance, so that the boat may be more easily driven over booms or other obstructions, and at the same time to render the boats more seaworthy and drier than sharper boats, which allow the spray to run up their sides and spread over the forward deck.

The forward tubes are very snugly encased in the bow, their ends being some considerable distance inboard, so as to avoid any projection which by throwing up spray would betray the position of the boat under the electric light at night.

The doors for the egress of the torpedoes form part of the skin of the ship when closed, and by a very simple arrangement open inwards when required.

The sterns of these vessels are of the form rendered necessary by our system of double rudders:—the outer end of the propeller shaft being carried by a strong bracket, to the lower end of which is attached a bar, connecting it with the keel of the vessel.

As may be seen from the section through the stern on Diagram No. 4, the combination of double rudders and this bar forms an admirable protection to the screw against floating obstructions, such as ropes, nets, &c., and I may mention in this connection that during the Danish manœuvres conducted last year, one part of their defence against torpedo-boats was a $2\frac{1}{2}$ -inch steel hawser fitted with cork floats, so as to have a surplus buoyancy of 8 lbs. per fathom.

Torpedo-boats of the ordinary type were easily caught and "hung up" by this device, but Captain Caroc, who was in charge of the torpedo-boats, drove one of these protected boats of ours fourteen times over this hawser at various angles without being caught.

The machinery on the Danish boats consists of a set of triple compound engines supplied with steam at 200 lbs. pressure per square inch by two of our patent tubulous boilers. The armament consists of two torpedo-tubes in the bow and two revolving tubes on a turret aft.

Instead of being arranged at an angle with each other, so as to give several angles of fire, as in the English first-class boats, these tubes, as may be seen from the diagram, were fitted parallel to each other, and arranged with the muzzles at alternate ends, so that one gun can be fired to port and one to starboard, but both guns cannot be fired from the same broadside without training the second gun round after the first has been fired. This, I think, is rather a disadvantage.

Besides the torpedo armament, a five-barrel Hotchkiss revolving cannon is fixed on the top of the forward conning-tower, and a similar one on the deck aft.

The contract speed of these vessels was $22\frac{1}{2}$ knots with a load of

10 tons on board on a run of three hours' duration, and $21\frac{1}{2}$ knots with 20 tons on board, but otherwise under the same conditions.

On the trial a speed of 22.66 knots was obtained under the first-named condition, and 21.53 knots under the second. The displacement of the vessels was about 100 tons on the full load trial, and the I.H.P. 1,270.

The circles were completed on an average of 80 seconds to star-board and 80 seconds to port.

In these vessels the Danish Government was anxious to secure a combination of high speed and great seaworthiness.

The first of these qualities was thoroughly tested in the estuary of the Thames before the vessels left this country, and the latter was tested after their arrival in Denmark by their being sent out during the months of November and December, as Captain Caroc expresses it, "with the intention of trying the boats in hard weather," a condition which they seem to have had no difficulty in securing at that time, with the result, as reported by Captain Hovgaard, who was in command, that "the new boats are able to keep the sea anywhere in our waters, even in the more open parts, such as the Baltic and the Skager-rack, for any length of time which their store of coal and water will permit."

Further on he writes: "We have tested the boats in heavy weather at high speed, and find that although they work heavily both forward and aft, still they do not leak or show any signs of weakness."

The arrangements in the dockyard at Copenhagen for the stowage and careful keeping of these boats and their stores are most completely worked out, and are certainly the best I have yet seen.

The boats are drawn up under sheds on the sides of a creek, the first class on one side and the second on the other. Each is provided with a separate slipway of comparatively cheap construction, and can be launched at any time and in any order.

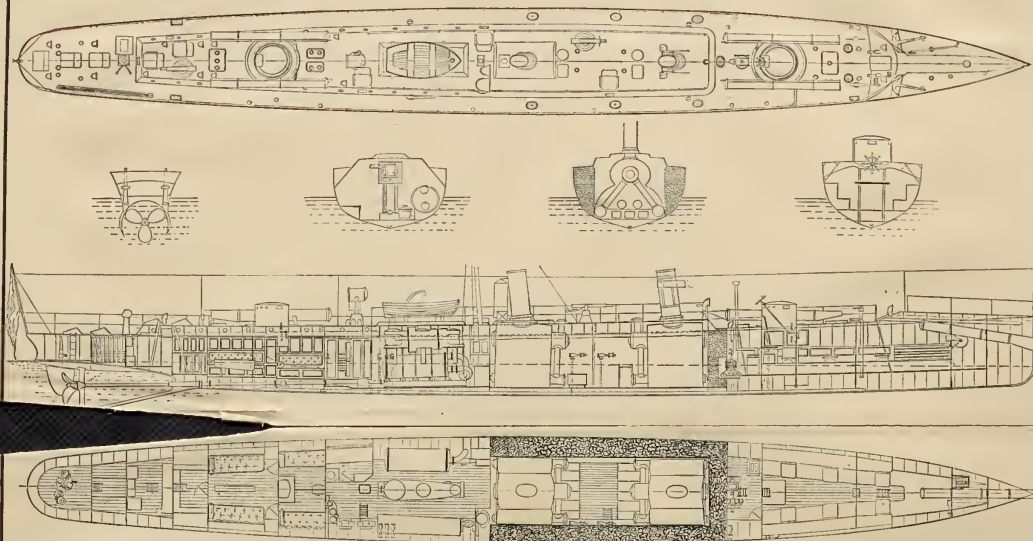
This, to my thinking, is a great improvement on the system which prevails in some dockyards of having only one slipway for a number of boats, and arrangements for shifting them endways for stowage when they are out of the water.

Large storehouses alongside an adjoining creek and communicating with the first creek are fitted up with well ventilated compartments, in which are stored all the articles required for the equipment and provisioning of each boat and its crew, the coal weighed out and standing all ready in bags, and everything ready for immediate use. As a consequence, such is the rapidity with which the boats can be got ready that I am assured that in from four to six hours from the order being received from the Admiral, a boat can be launched, manned, and equipped, and be under steam ready for sea.

With her flotilla of large boats thus easily mobilized, and the number of smaller boats she has, which can be transported by rail across the islands for the protection of the Belts, coupled with the new forts she is constructing, and her mine-fields, it does not need the eye of an expert to see that Denmark will not be a *quantité négligible* in any naval war in which access to the Baltic is important.

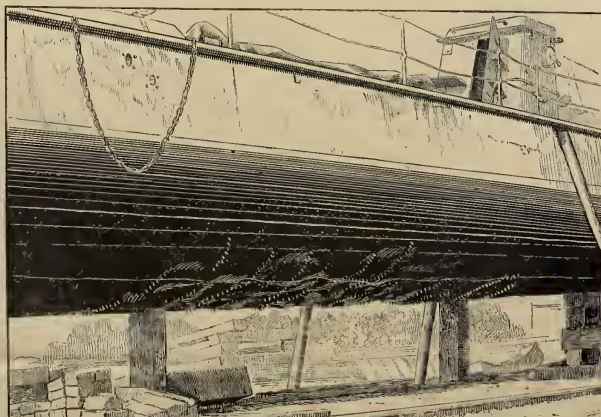
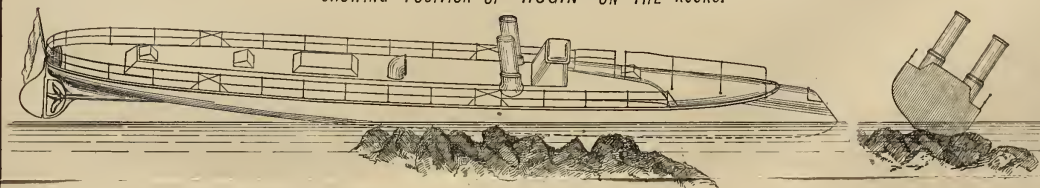
Diag 5.

GENERAL ARRANGEMENT OF 1ST CLASS TORPEDO BOAT FOR THE INDIAN GOVERNMENT.



Diag 6.

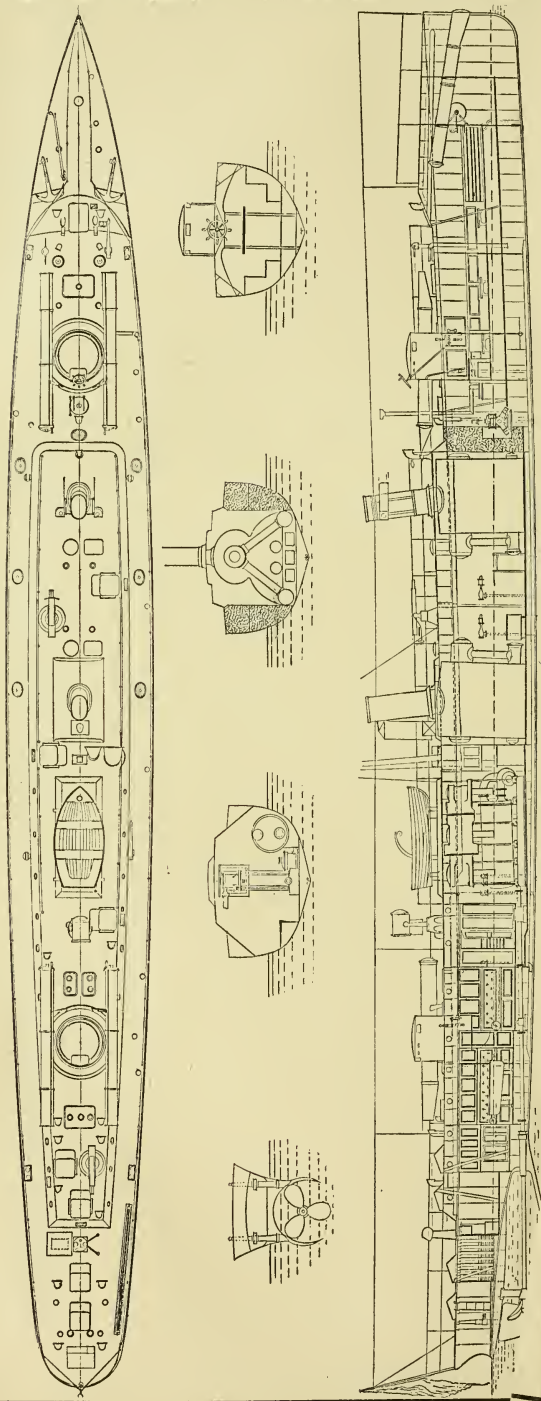
SHOWING POSITION OF "HUGIN" ON THE ROCKS.



VIEW SHOWING BOTTOM OF "HUGIN" AFTER BEING ON ROCKS.

Diag 5.

GENERAL ARRANGEMENT OF 1ST CLASS TORPEDO BOAT FOR THE INDIAN GOVERNMENT.



VIEW SHOWING BOTTOM OF "HUGIN" AFTER BEING ON ROCKS.

Before leaving this part of my subject, I may say that we have now in hand for Denmark a couple of very powerful little vessels of about the largest size suited for railway transport, one feature of which is that by way of still further ascertaining the possibilities appertaining to our patent boilers, we propose to use a steam pressure of 250 lbs. per square inch.

We come now to No. 5 diagram (Plate 7) which illustrates a type of vessel of which we have just completed three for the Government of India.

These vessels are similar in many respects to the Danish first-class boats, but only have one torpedo tube in the bow, and two swivelling tubes on each conning tower, the armament being thus in all respects similar to that on the first-class boats built by us for the English Admiralty.

The single tube in the centre of the stem is not good, as the cap, besides being liable to be carried away by the sea, will certainly, when there is much sea on, throw up a considerable amount of spray, and so aid in the discovery of the vessel under the action of the enemy's search lights.

A better arrangement to my thinking, if a single tube is wanted in the bow, would be to put it on one side of the stem with a flush door as in the Danish boats.

I think also the tubes on the forward conning tower might have been dispensed with, three tubes being considered ample by the torpedo authorities at the Admiralty.

The dimensions of these vessels are: length, 134 feet 7 inches; beam, 14 feet 9 inches; and draught of water, 7 feet 1 inch.

The stipulated speed was 22 knots on a run of two hours' duration with a load of 20 tons on board.

On trial, the first boat, with a comparatively untrained crew, attained a speed of only 21·94 knots; while the second and third, with trained crews, attained speeds of 23·15 and 23·25 knots respectively.

These results are interesting as illustrating the fact that no matter how we may improve our mechanism, the result obtained is controlled by the human element which manages it.

The displacement of these vessels was a little over 96 tons, and the I.H.P. 1,262, giving a displacement coefficient of 207.

The metacentric height was stipulated to be between 1·2 and 2 feet, and was found on trial to be 1·6 feet upon conditions of tendering and 1·55 feet when loaded for the voyage to India.

With a view to determine the evaporative efficiency of the tubulous boilers with which these vessels were fitted, a careful experiment was conducted with the concurrence of the India Office on the advice of the Admiralty, by Professor Kennedy, of the University College, on one of the boilers of the last of these three vessels, the principal results being that with natural draught; and the engines developing 89 I.H.P., the evaporative duty was 13·4 lbs. of water per pound of coal, and a coal consumption of 2·28 lbs. of coal per I.H.P. per hour.

On another experiment with an air pressure of 0·27 inch, and the engines developing 282 I.H.P., the evaporative duty was 12·48 lbs. of water per pound of coal, and the coal consumption 1·98 lbs. per I.H.P. per hour.

On a third experiment with 0·49 inch of air pressure, the engines developing 449 I.H.P., the evaporative duty was 12 lbs. of water per pound of coal, and the coal consumption 1·99 lbs. per I.H.P. per hour.

On a fourth trial with 2 inches of air pressure, the engines developing the full power of which they were capable with one boiler, namely, 775 I.H.P., the evaporative duty was found to be 10·29 lbs. of water per pound of coal, and the coal consumption 2·26 lbs. of coal per I.H.P. per hour.

The coal consumption on these experiments seems high, but it will be readily understood that as the horse-power of the main engines only was used in the calculation, and no account whatever taken of the auxiliary engines, all of which, especially the donkey, were very extravagant in their use of steam, the result is very small indeed.

I may further add with regard to these trials, that on the natural draught trial the temperature of the chimney gases was only 421° F., and on the full speed trial when the boiler was supplying steam for 775 I.H.P., the temperature was only 777° F.

These facts, and the low velocity of the draught, fully account for the absence of flames and ashes from the chimney.

The evaporative value of the coal was found by calculation from its chemical constituents to be equal to 15·41 lbs. of water per lb. of coal from and at 212° F., and this was corroborated by a calorimetric experiment, the result of which differed only by about 1 per cent. from the calculated result.

The efficiency of the boiler with natural draught was therefore $\frac{13\cdot4}{15\cdot4}$, or 87 per cent. of the theoretical evaporation, a result concerning which Professor Kennedy says:—

“It is only right that I should say that this is the highest boiler efficiency I have ever found upon any trial with which I have had to do, if indeed it is not, as I almost think it is, the highest on record in any trustworthy manner.”

In summing up the result of all the trials, Professor Kennedy says further:—

“I have already remarked on the most notable evaporative efficiency of Mr. Thornycroft’s boiler when working at very low pressure.

“The manner in which it retains that high efficiency when doing seven times as much work is perhaps equally remarkable.

“That one and the same boiler should be able to supply steam for powers varying from 90 to 770, maintaining so high an average efficiency throughout the whole range, is a most remarkable result, and one on which you may fairly be congratulated.”

I may add that the weight of the boiler experimented on, with all its fittings, mountings, water, pipes, donkey, spare gear, and funnel, was only 11·3 tons, which gives 68 I.H.P. per ton of boiler, and compares

favourably with the locomotive boiler of about the same power in a torpedo-boat which only gives 48 I.H.P. per ton, or the same type of boiler in use in the later English torpedo-catchers, which is still worse, only giving 43 I.H.P. per ton.

These facts speak for themselves as to the advantage to be derived from the use of our boiler in the latter classes of vessel, and I may say that we have been invited by our own and several foreign Governments to submit proposals for boilers ranging from 3,200 to 6,300 I.H.P.

In my former lectures, in addition to the ordinary experiments undertaken to show the efficiency of the boats and their machinery in certain directions, I have described certain unintentional experiments which test them in an unexpected and general way, and show what may be done with them without causing fatal injury, and in this respect I may say that notwithstanding the rough usage to which these boats have been subjected, not one of all the many boats we have built has ever been lost.

My story on this occasion is that of the misadventures of the Swedish torpedo-boat "Hugin," the details of which were furnished to me by my friend Mr. Lilliehöök of the Swedish Navy.

"The 'Hugin,'" says Mr. Lilliehöök, "with three other boats was to start for a full speed run. A fearful storm, accompanied by the pouring down of hail and rain, was prevailing at the time. When the boat had traversed about a mile and attained a speed of $13\frac{1}{2}$ knots (engines running at about 250 revolutions), it struck all of a sudden against a rock with such a force that the boat was thrown up into the rock with its propeller high and dry, the tip of a perpendicularly downward-turned blade being nearly 2 feet clear of the water-level.

"When it came to rest the boat was leaning over to starboard and very near capsizing toward that side. The bottom had been moderately hurt all along the starboard keel plate from the stern aft as far as the boiler, where the bottom plating was considerably dented. The boiler was hereby somewhat dislocated, but without injuring the piping. Further aft the boat had not received any injury whatever. The fire extinguishing apparatus could not be used, because no water could be got through the feed pipe, as the inlet hole in the bottom was a foot clear of the water-level on account of the boat leaning so much over to starboard. The fire, which was very heavy at the time, had to be put out by pitching in water through the fire doors.

"Two gunboats of 600 tons each had a hard job to pull the boat off, but succeeded after several attempts. The plating had not been at all torn or broken, in fact most plates might have been put in again in repairing, but the rivets along the joints had been torn out, leaving several hundred holes in her bottom open. These holes were plugged with wooden plugs by the diver, and afterwards steam was got up, and the boat went to the station without further assistance. No injury whatever had happened to engine or boiler. The accompanying sketch will give you an idea of the appearance of the boat as it was lodging on the rock."

This sketch, so kindly sent by Mr. Lilliehöök, I have had enlarged in Diagram No. 5 as a fine example of what may be done upon occasion with a Thornycroft torpedo-boat.

The large photograph on the table shows the vessel as I saw her in the dockyard in Stockholm in August last.

As a comparatively untried weapon, the torpedo-boat has been the subject of much discussion, and many and widely differing opinions have been expressed as to its value in naval warfare.

Starting originally as a coast defence armament, the torpedo-boat has been studied under all sorts of conditions, from lying in harbour and being blockaded to keeping the sea and assisting in the blockade.

The result of these studies is best seen in the large numbers of torpedo-boats which now enter into the composition of all the more important navies, the tendency in the smaller navies being to keep the vessels of a moderate size and reserve them for coast defence, and in the larger and more powerful to increase their size, and use them more in fleet operations. The danger in the latter case is that by the vessels being made larger and more costly the advantages of numbers and the subdivision of crews is lost. Our eggs, in fact, are put into fewer baskets.

This is the case in our own Navy, where coast defence by torpedo-boats is not so much studied as I think it ought to be, both from the direct and the indirect advantages which may accrue from it.

So long as we are strong and able to keep our enemies away from these shores by blockading or masking them in their own ports, or by any other of the processes known to and recommended by experts, we shall not need torpedo-boats to prevent our seaboard towns from being harassed and requisitioned by an enemy's cruisers. But suppose that our enemies, although otherwise inferior to us were nevertheless well equipped with torpedo-boats, and by them were able to destroy some of our blockading ships, or to compel them to keep at such a distance as would enable some of their swifter vessels to escape our toils, as happened, for example, in the mimic warfare of last year, would it not be well to have a few torpedo-boats ready at each of our principal mercantile ports, in addition to those at our naval ports, to meet those vessels, and prevent the damage which would otherwise ensue?

I think it would, but I fear I am right in saying that at present there is not a single torpedo-boat at any purely mercantile port in this country, and the numbers in our naval ports are far too few to meet the demands which may be made on them should we unhappily be involved in war.

Among the indirect advantages which would accrue from a distribution of torpedo-boats around our coasts would be the encouragement of our naval volunteers, in whose hands and at whose disposal the vessels would, I presume, be placed, as has been suggested by Mr. Arnold Foster and others.

Such encouragement, similar to that extended to our military volunteers by the issue of the necessary guns, rifles, and ammunition for target practice in the early days of the movement, would have a

similar effect, and—who knows?—perhaps we might in time have a naval volunteer force attached to our first line of defence, which would rival in importance, if not in numbers, the military organization.

A corps like this would be a rare reserve, better far than any a conscription could give us, as its members, not necessarily being professional seamen, would be able to serve at sea without denuding our merchant ships of their crews, and thus imperilling our food supplies. They would have all the traditional comparative value of a volunteer, and in addition would be more thoroughly trained in relation to their work than were the victims of the press-gangs of our old wars.

It has often occurred to me that in these old wars, the pluck, resourcefulness, and endurance of our crews, independently of the skill and valour of their Officers, were the immediate means by which our victories were obtained.

But what have we to correspond with them in these days of steam and machinery?

A pump valve and a piston rod on an enemy's vessel are equally good, and equally to be depended on as the same details in a British vessel, and in this respect the only places where pluck, resourcefulness, and endurance have the best chance of doing what they did in the old days are in the stokehold and engine-room of a modern man-of-war. If to these be added daring enterprise and self-denial, a torpedo-boat is perhaps the most likely place in which they can be seen to the utmost advantage, and where men, constitutionally fit, have the opportunity of showing that in these days of science and examinations they have not degenerated from the standard which was sufficient to make and maintain our British supremacy.

As a proof that they have not so degenerated, I cannot do better than conclude by quoting the testimony of Admiral Baird in his Report on the last year's manœuvres, dated, "Off Deal, August 20th, 1888." Admiral Baird says: "The services of the torpedo flotilla have been invaluable. In regard to this portion of the Fleet, I can but observe that the skill, untiring energy, and cheerful endurance of the extreme discomfort and privation manifested by Officers and men alike have been the admiration of all who have witnessed the operations of the Fleet."

Colonel Sir OWEN BURNE: I think we ought all to be grateful to Mr. Donaldson for his very able and interesting lecture, and moreover we owe a great obligation, in my opinion, to his firm for their ingenious invention of the tubulous boiler. I had the pleasure on a recent occasion to take part in a trial of one of the torpedo-boats ordered by the Indian Government, and I must say I was greatly impressed with the working of the tubulous boiler, the almost instantaneous manner in which the boat could be stopped at full speed, and the way in which it was manœuvred backwards and forwards and in circles. I think Mr. Donaldson has brought two valuable points to our notice. First, he has reminded us of the great importance of having trained crews for these boats. I am glad to say so far as the Indian Government are concerned, they are taking steps to man with special crews the boats sent out to that country. Secondly, he has drawn our attention to the value of torpedo-boats for defensive purposes. I speak with some reserve in the

presence of naval Officers, but I have good ground for believing that the power of these boats for offensive purposes has been rather exaggerated, while that for defensive purposes has been somewhat overlooked, and I am convinced, after some small experience, that if we can only use our torpedo-boats for the defence of our naval and mercantile ports, using them as scouts, and placing them in time of danger at the mouths of rivers where it may be impossible to build permanent fortifications, and yet where an enemy's cruiser may come with impunity and destroy every ship attempting to enter that river, they would be of great service. In such rivers, for instance, as the Calcutta Hoogly, and others easily named, torpedo-boats would be of great importance. I should like to put one or two questions to Mr. Donaldson on the general subject, as his answers may add interest to his useful lecture. Perhaps he will have no objection to tell us what is the cost of such torpedo-boats as those sent out by the Indian Government, and what is the cost of their armament; also, what number of men in his opinion are required to man and maintain each boat; also, what amount of coal such boats can carry. I should also like to ask him whether he is satisfied with the way in which the steering gear is changed from the wheel in the bow to the wheel in the centre of the boat, because this was rather a weak part of the boat, so far as I was able to judge, in the trial trip already mentioned. What Mr. Donaldson has told us of the behaviour of torpedo-boats in rough weather has been extremely valuable, the more so, because his firm are, I believe, going to despatch their three torpedo-boats to India by long sea. Still, in my humble judgment, a torpedo-boat is more useful in smooth water for the defence of ports than for offensive purposes in rough water, where there is often some considerable difficulty in firing a torpedo at all, or in hitting a ship.

Professor ALEXANDER B. W. KENNEDY: My name has been mentioned in Mr. Donaldson's paper, and as I had the pleasure of making a number of trials of the machinery of one of the Indian boats, which is represented in Diagram No. 5, I should be glad to say a few words in reference to this paper, which I have heard with as much interest as I believe any one in this room can have heard it. First of all, it will be noted as regards the economical working of the boiler, that the results are extremely good. I should like to say, in reference to these results, that they were not mere results got from short or perfunctory trials of any kind. The trials were made in a most detailed fashion, and all but one of them were, I think, five-hour trials. For the whole of this time I not merely measured the coal, weighing out each cwt. as it went into the fire, but I also measured all the water with at least equal accuracy. In order to make quite sure that no error crept in, I had numerous samples of the gases drawn from the chimney, and had them analyzed, and I found of what they consisted, what their weight was, how much heat they were taking up the chimney, and so forth. This enabled me to add to the heat that went into the water the heat that went up the chimney, and in other ways to account for all the heat that I had already found to be due to the combustion of the fuel, except a difference perhaps of about 2 per cent., so that one felt quite certain that the figures could be trusted, and that they accurately represented the results of the long trials. As Mr. Donaldson has stated, no doubt if such a boat and such machines were put into the hands of people who did not know how to manage her, she would use very much more coal to do the same work, but there is no doubt that with no larger staff than her proper complement of men, the results given were and could be again obtained. The boat, which is about 140 feet long, ran at a rate of about $10\frac{1}{2}$ knots, with a consumption of 203 lbs. of coal per hour, running with one boiler only. $10\frac{1}{2}$ knots is as much speed as a boat wants in ordinary circumstances, and this happens to be her most economical condition of working. On the other hand, with the one boiler the speed was increased to about $17\frac{1}{2}$ or 18 knots average speed in about a quarter of an hour. That is to say, on one and the same day, it was necessary for the purposes of the trials to have a certain run at a low speed, and then to start the main trial of the day later on. The low speed trial being finished, the signal was given that full speed was required, and in about seven or eight minutes the speed of the engines had been increased from about 190 to 318 revolutions per minute, and the engines were doing 770 I.H.P. instead of about 90 I.H.P. In a quarter of an hour she was running steadily on her new speed, that is to say, in a quarter of an hour

from the time I told the stoker he was to go ahead; and when word was sent to the engine-room that they were to get ready for going full speed, the speed of the boat was nearly doubled, and she continued to run steadily at the full speed during the whole of the rest of the trial. That struck me as being in itself an extremely remarkable achievement. Of course that was done by one boiler, and one boiler only, and at every range of power that I have in my notes—90, 150, 280, 449, and 775 H.P. she seemed to work easily, and as far as I could see equally without priming. Even at the highest speed the combustion was quite economical, although of course it was not so economical when the boilers were forced to that extent as otherwise. I do not know whether it is worth mentioning, but I must say I found no difficulty in going into the stoke-hole, that is, in opening the door and going down, while we had air-pressure equal to 2 inches in the stoke-hole. Opening the door and closing it again somewhat frequently to let somebody up or down made no sensible inconvenience or additional difficulty to the stokers. I have dealt with the subject from a purely technical or engineer's point of view. I should like to add, however, that I was extremely struck with the steering qualities of the boat. In making her way down the Pool on dark and misty November mornings, the Pool very full of shipping of all kinds, the way in which she described figures of "8," or at any rate of "S," among the barges was really a treat to see. I started these trials—I never told my friend Mr. Thornycroft so, but it is true nevertheless—with feelings not of unqualified admiration for his boiler. Its very peculiar and novel construction made one feel doubtful as to how it was going to behave, and there were many points about which I thought it could only be tested by trials. By the time I had finished the trials, however, I must say I had come to a thorough belief in the excellence of the boiler, and that by the only satisfactory process, viz., finding out that the boiler was doing thoroughly well. There were no tokens during any of the trials that I could see of any priming taking place at all, and, as far as I could judge, the steam was dry. It is perhaps right that I should emphasize one point. Mr. Donaldson has remarked on the coal consumption per I.H.P. Of course, in a little boat of this kind, the main engines are very economical, but there are steering engines, circulating pump engines, fan engines, and the donkey pump in the engine-room, all of which are using steam not very economically, and the coal consumption per I.H.P. is merely got by dividing the whole coal used over I.H.P. of the main engines, taking no account of unmeasured I.H.P. of all the small engines; and therefore the coal consumption per I.H.P., although not so low as in first-class marine practice, was not strictly comparable with it, because of the very large proportion of the whole steam used up by the comparatively uneconomical auxiliary engines, the power exerted by which there was no means of taking into account. It is only right that this should be stated.

Lieutenant BADEN-POWELL: I should like to ask Mr. Donaldson a question that has occurred to me from watching the torpedo-boat at practice at sea, and it is as to the protection of the torpedo-boat in future wars from the quick-firing and machine-guns of modern generations. It seems to me that at present, when our first-class torpedo-boat goes into action against an ironclad, it becomes a question simply of victory or death, and that is a very serious question for consideration when you ask volunteers of coast ports to man these vessels in time of war. As a rule, men will fight for the defence of their country and their ports, but to ask them to go on a kind of forlorn hope, in which it is certain death if it be not victory, is a serious thing. I think that the subject of the protection of these boats has been, perhaps, in the minds of ordinary individuals, thought to be neglected. No doubt authorities and designers of these boats desire to carry as little weight as possible, so as to keep the displacement within reasonable bounds, so as to get the best speed, the best manœuvring powers; but it does seem to me the boats are comparatively egg-shells when placed under fire from a modern man-of-war. Of course, in larger vessels there is coal protection; in the cruisers there is a possibility of coal protection and armoured decks, but in these torpedo-boats the coal protection can only be a very small distance along the body of the vessel, and of course if the vessel is travelling across the line of fire of quick-firing guns at great speed she is something like a flight of ducks passing a shot gun, where the first bird may receive a portion of the charge, and the last and all the intermediate birds also: they get a kind of

sweeping fire. Of course, the torpedo-boats are, I presume, shot-proof, but what I should like to ask Mr. Donaldson is this: Have the builders or the Admiralty really considered to what extent torpedo-boats may be riddled, before they send these valuable craft, with valuable lives on board, into action? I do not doubt that in night fighting a vessel might be so manœuvred as to come up with the enemy without being seen, and get away with security, but still there is a grave risk, and no man would like to show the white feather, though the risk were ever so great, and he would take her into action even though it was certain he was going to be sunk. A second question is the sea-going qualities of these boats. We know that nearly all the crews that have been on board for any length of time have been reported utterly worn out. Why is it? Is it the motion of the boats? Is it that they are comparatively unseaworthy from their excessive rolling or from some peculiarity about the style of boat which may be necessary for their speed and for their construction? Or is it that it is merely that the men are not accustomed to live on small vessels? I may say in yachting we have found in small racing boats it is very difficult to get the crew to live on board unless they are accustomed to small craft. You may get men out of small shrimping craft who live comfortably on a small narrow racing boat, whereas other big ship men turn ill, and won't serve at any price whatever. It may be the same with men-of-war's men accustomed to comparative ease on the lower deck when they are cramped up in the torpedo-boat, but still there is that objection to service in torpedo-boats which requires some explanation. The rolling of the boats is undoubted. Any man who has seen a torpedo-boat in a ground swell knows how tremendously they roll, and I would throw out a suggestion as to whether such a thing as "bilge drop keels" have been tried. I can give practical assurance that in a small sailing boat I built last year, 20 feet long by 4 feet 6 inches, and 2 feet draft, I put in two bilge drop-keels instead of a centre drop-keel, standing out at an angle of 15° to the perpendicular. They were centre-boards, in fact, only on the side, and when the boat was rolling gunwale under in running a race with keels up, we could lower 8 or 10 inches of these bilge keels and stop the rolling immediately. You could lower them as much as 3 feet. These bilge keels might also form, being steel plates, a certain amount of protection for the boiler, if carried abreast of the boiler. Whether such plates could be carried in a torpedo-boat is a question for scientific designers and builders of boats to determine, but they might get over that dangerous rolling without the additional stoppage of speed which an ordinary fixed bilge keel outside would give the boat. There is another point also on the sea-going question, and that is that this boat in time of war would be required to a certain extent to keep a look-out, to be outside the ports, and I would suggest it should be considered as to whether some kind of sea anchor cannot be used in these boats in order to conserve their steam and fuel for the vital moment, when they have either to fight or run in to give notice of the approach of the enemy. There is no doubt that the drift-net fishermen lie comfortably up if at anchor, and riding to their nets in the worst gale in the North Sea. Why should not a torpedo-boat have an equivalent in the way of a sea anchor? The quarter rudders, I suppose, are the Thornycroft patent, but I had the pleasure of being on a steam launch last year which was fitted with quarter rudders, and her manœuvring was something ridiculously good compared to anything else I had ever been on board; you could go ahead or astern, and steer with as perfect certainty going astern as ahead. It was simply marvellous. These were rudders fitted by Mr. Harrison, an engineer. I dare say Mr. Donaldson has heard of them. At any rate, I had the pleasure of being on board the boat, and was very much struck with their efficiency. Of course they are a protection, I presume, also to the propeller, and if the boat were jumping in a sea-way it might assist in protecting the propeller from the small shell-guns of a ship. Well, now, as to the volunteers being put on board torpedo-boats, I must say, though I have had a great deal to do with volunteers since I have been on shore, I think Mr. Donaldson must agree with me that these torpedo-boats are rather too delicate an instrument to put into the hands of untrained people, and unless torpedo-boats are given to volunteers in time of peace, to enable them to be trained and to get accustomed to them, and to have the very best yacht engineers also enrolled in the volunteers to look after the engines and keep all that delicate machinery constantly in proper order, it would be simply like giving

a first-class chronometer to a child to play with. They would get out of order, and when they were wanted in war they would be useless. I have only one other question, and that is I see that some of these torpedo-boats, and I presume the latest, have twin screws. I should like to ask whether these twin screws are capable, as in a big ship, of being worked independently of one another with a single boiler, so that if one boiler were riddled, or some accident from a shell or piece of shell, or something else going wrong in one of the engines, the vessel could be taken out of action by her single remaining propeller. If so, I can only say that the twin screw is the best of any single screw torpedo-boat that exists at the present time or may be built in the future.

Sir NATHANIEL BARNABY: I have been exceedingly interested in the paper which has been read by Mr. Donaldson. I have been pretty familiar with the work which has been done by our excellent torpedo-boat builders in England and the boats of other countries, but we have had it all brought to us here to-day in a form which makes one feel how wise it has been on the part of the Government to have given a free hand to private builders to design ships of this class. I remember very well before we had one of these boats at all in the Royal Navy I was asked to design for building in one of the dockyards a boat of the kind which Mr. Thornycroft has so successfully built. I did not know him well then, but I knew that it would be an unwise thing for us to try in the dockyard to build vessels of that kind; that it would be far wiser to let these able men and their rivals do the best they could, and the result we see here before us, a wonderful result in every way, whether you look at the hull or engines or boilers. We were told when we began that these boats were so thin, that they were only the thickness of a piece of paper, there was no strength in them. But look at these diagrams. Here is a boat hung up on a rock, from which she is successfully floated, and when one sees that, one cannot help feeling that in regard to the structure of the hull the vessel is perfect. And then when you come to the engines, we see them doing in these boats what we could never have tried in ships. They have been running them at very high velocities and obtaining results which the shipbuilders have been able to follow with great advantage, but which they never could have initiated. And then as to the boiler. I see the gentleman sitting here through whom the Admiralty first introduced a boiler of this kind, I mean the "Herreschoff" boiler, into England. We heard very good accounts of its excellent behaviour, and the then Controller of the Navy, Sir Houston Stewart, was desirous of having one. One came; it had some excellent properties, but it was not repeated. Several attempts were made by English builders to make a better job of it, and now we have it. It has been so successful that my friend Mr. Grenfell, who has been referred to here, and who, although a missionary and not a mechanic at all, succeeded in putting the engines and boat together with only African labour—this good man tells me that the boat has given him no trouble whatever. The boat and engines and boilers have all worked for the five years he has had them with the greatest smoothness. That speaks most highly of what we are told is, and what really is, a very delicate instrument. It is undoubtedly true, as pointed out by the gentleman who has just spoken, that she can be pierced by shot. I have heard that so often said concerning big ships, for which I was responsible, that I can sympathize with our friends the torpedo-boat builders when it is said that the shots can get in. Of course they can, and I have no doubt the people in the torpedo-boat will feel terribly nervous when they are going to make the attack. But be perfectly sure the people will be very nervous on board the ironclad that is going to be attacked. That is an important thing. If you can succeed in making the other fellows nervous, never mind that you are running some risks yourselves. The real point lies, I think, there. It can be of no use to attempt to give protection against shot. I know that in France, where they have enormous ironclads of 11,000 and 12,000 tons, they are as nervous as can be over this fact, that the whole of their batteries can be searched out by machine-gun fire. They know that, and they do not see how to remedy it. But if you cannot remedy it in a ship like that, what are you to do with such vessels as these? The best thing you can do is to get a number of them and make them as good as ever you can. As to their seaworthiness, my own view was always that it was not fair to the sailors to put them on board these boats for long service—that they ought to be relieved

frequently from the ships to which they were attached. It is not fair to put them for many days and even weeks together to live in a vessel like that. No mortal man can build such a vessel which would have any degree of comfort in it, and continued existence in it would take the spirit out of any sailors. There are no men better than the English Officers and sailors: they would not cry out till they were obliged; but the men who are in charge ought to take care that they are not treated in a most improper manner by being called to go on day after day at this most trying work. It has been said that more of them are wanted for coast defence. I doubt whether you will ever get them. The Army officials always think they ought to have the money, and the Navy officials think they ought to have it. You have great men who are always pulling the purse-strings for the Army and for the Navy. I do not believe either would care to trouble themselves about what you call coast defence, which comes something between the two. What the Navy people would always say is, "We are not going to allow the enemy to come anywhere near Liverpool or Belfast." Let us hope it may be so, but at any rate there lies the difficulty that I fear the money will not be found, although I wish all success to Mr. Donaldson and his efforts to get an order for vessels of this kind. I have listened to his paper and seen the diagrams and the illustrations with the greatest possible pleasure. Any one who is at all familiar with the immense progress that these boats have made during the last few years can only feel proud that they have been produced in his native country, and that England has the honour to have been the first in the field with them.

Captain CURTIS: I should like to touch on one point only, and that is with respect to the boiler, especially as no other speaker has referred to it. I mean, how long will that boiler last without the deposit being cleared? and when they clear the deposit, how do they do it? It seems to me that outside the tubes, and between the interstices of the tubes, there must be a certain quantity of dust or matter from the fuel which must cohere to them. How do they clean it and clear the deposit out of the tubes?

Mr. THORNYCROFT: May I be allowed to say a few words about a question that has been put? The question of clearing the dust from between the tubes is a somewhat difficult one, and I must say it has not been altogether satisfactorily solved; but I can say this, which I think will show the meeting that although not solved, it is not so important as it might appear. In the trials which Professor Kennedy made with the boiler he made those trials with a boiler of a boat which had made all its trials; the boat had run a considerable number of trials, and the boiler had never been properly cleaned. The boiler was not in any way specially prepared for those trials. Perhaps that was an unwise thing to do, because if the boiler had been thoroughly cleaned, it might have got a little higher result. But Professor Kennedy would not allow us much higher duty. . . . He said there was not room for it in the actual duty which was contained in the coal. Previous to trying these experiments there was a certain clearance made of the dust in between the tubes. Those boilers are fitted with a large steam pipe leading into the fire-box, and before running on one occasion this was used with all the energy we could get out of it. The steam was turned on, and the result was an enormous black cloud of dust and dirt came out of the funnel, and quite obscured the free view of a barge rather near to the boat, so that it was evident something went out. That seems to make the tubes clear enough for all practical purposes, and we hope by some little alteration in the door to get out more. With regard to deposit in the tubes, I do not know of any trouble at present. The circulation in these tubes is more energetic than in ordinary boilers, and we are in hopes the boilers may run many years without any trouble. The model you saw working on the table showed one peculiarity about the circulation in these tubes. It is a kind of periodic flow, it is not quite a constant stream, and therefore the amount of energy to prevent anything sticking inside the tubes is greater than it would be if it were a constant flow. If you notice it comes out more by spurts. The Americans many years ago used tubulous boilers in which the water was pumped through the tubes, and it was said of those boilers that no actual stony deposit was lodged in the tubes: whether that was so or not I do not know. Some remarks have been made on the sea-going qualities of these boats, and I would like to say one or two words about them. The boats with

rudders on each side of the screws have some qualities which at first were feared. The stern was built hollow, and it looks at first sight as though the water would slack underneath the stern and be dangerous to the structure of the hull in a heavy sea; but I believe in actual practice the action of the propeller stops any water falling away: the stream of water follows up, and the sea does not shock, except when at anchor, and I believe there is a little shock then, but under way there is never any shock felt under the stern. This peculiar form of stern has one great advantage in maintaining the boat more nearly along the surface of the water than in the case of the ordinary form of hull. The stern seems stuck down to the sea, and the freeboard of the boat aft scarcely changes. It must be considerably rough weather when the bow of the boat will throw right out of the water, but the stern would not change more than 6 inches. Of course that is more favourable to the boat, because if the stern also moves, the motion of the bow would be even greater. With regard to the snouts that have been more abused than they need be of these boats, I think they have come into disrepute by the boats being overloaded. Some boats, built with what were called snouts, were overloaded, and it was said that they were raised because water came on board. The fact was that the water did not come on board till they were overloaded. I superintended the trials of the "Coureur" at Cherbourg, last autumn, and I was at sea a good deal, sometimes in roughish weather. I went out repeatedly, and on the boat which you see represented by Diagram No. 3, on the forward deck I did not get my boots wet in the heaviest sea. In the Indian boats, which have not this form of bow, the spray went over the top of our heads in the Thames sometimes. How you account for it I do not quite know, but it seems to amount to this, with the round bow the water in the form of spray will rise up and flow right over it, without leaving the surface of the hull. The wave will rise on it and fall again; whereas the water coming to the sharp angle of the gunwale of the higher boat, the water leaves the boat and flies up in the air. Of the forms of bow, the snout or round form gives the driest deck, is stronger, and is much more comfortable. I do not think I need trouble the meeting with any further remarks.

Mr. DELABERIE W. MARSDEN: Perhaps, Sir, as the employment of naval volunteers in torpedo-boats has been referred to, you will permit me as a member of the force to express the pleasure it would give, at all events to the members of the London Brigade, to be entrusted with a torpedo-boat for the defence of the Thames. With what has been said as to the uselessness of expecting volunteers to man these torpedo-boats without practice in time of peace, I cordially agree. Of course what the naval volunteers would wish for would be that a torpedo-boat should be entrusted to each coast corps for practice in time of peace. One advantage of such use of a torpedo-boat would be that they would gain a familiarity with the estuaries which the coast corps is theoretically intended to defend, which is so much to be desired, and I venture to suggest to Mr. Donaldson, that if the Government would grant this great boon, it might perhaps induce many of Mr. Thornycroft's own employés and the employés of other firms engaged in the construction of torpedo-boats to join not only the London corps, but other corps in the country. On behalf of the members of the London Brigade, I may say they would be most cordially welcomed. I have had the pleasure of meeting one of the employés of the Yarrow Company, a member of the London Brigade of the Royal Naval Artillery Volunteers, at the only time that any opportunity was given us by the Government of obtaining any experience in the use of torpedoes, when his experience was of great use to us. I apologize for offering these few remarks, but I have been requested by Lieutenant-Commanding Seth Smith, who has unfortunately been obliged to leave, to say a few words to express the pleasure with which the members of the London Brigade would welcome any such trust placed in them by the Government.

Admiral BOYS: Before you call on Mr. Donaldson to reply, may I ask one or two practical questions? They may be matters of history, but they may have a very important bearing on the question. The first question is: Have any experiments or trials been made and results recorded as to the right colour for painting these torpedo-boats? It is a known fact that the colour most suitable during the day is not the most appropriate during night under the electric light. I believe the colour least visible under the electric light is a black. Another point is, respecting the

escape of steam from the funnel, especially at night, because those who have conducted torpedo experiments at night are aware that generally the first indication of the proximity of a torpedo boat is from the electric light shining on the steam escaping from the funnel. Is there any possibility of causing that escape to be delivered under water, or disposed of in such a way as to be invisible? If so, it would be a great advantage to the boat. As to the noiselessness of the boat. Are these boats and their engines as noiseless as possible? During the trials made by the original Torpedo Committee in attacking the "Monarch" at Spithead we had one launch, especially, so noisy that she was always heard before she was seen at night when it was anything like moderate or fine weather. Allusion has been made to the perforation of these torpedo-boats by projectiles. It may not be generally known, but still it is a curious fact, proved by trial, that when the bottom of a torpedo-boat has been perforated by bullets and she was going at full speed, no water entered when she was travelling fast through the water, but immediately she reduced speed or stopped, then the water began to flow in. I know that it would be simply impossible to put protection in the form of armour in torpedo-boats. If you construct vessels large enough to carry armour they become torpedo-ships, but boats could not carry it. Lightness is the great desideratum in the construction of torpedo-boats; nothing in the shape of iron plate to resist even a musket ball could be employed. I must express my thanks to Mr. Donaldson for having delivered to us so interesting and instructive a lecture.

Captain WILLAN: I rise with very great diffidence to say anything in an assembly of this kind, because I have never been in the Navy, and I am not a practical engineer. My excuse must be that I was the owner of the first steamboat Mr. Thornycroft ever built, twenty-four or twenty-five years ago, a very different boat to those we see before us now. After that I owned two others, one a boat of considerable speed, 14 or 15 knots, which I sold, after using her on the river and sea, for a torpedo-boat. I simply mention that to show that I am not absolutely ignorant of these boats, and having taken great interest in them, and having been on torpedo-boats at different times, though I may call myself a non-professional man, I have some slight acquaintance with them. I wish to say a few words about a question already touched upon by Mr. Donaldson and one or two of the speakers, as to what we may call perhaps volunteer torpedo-boats. I was very nearly prevented from rising altogether by the remarks of one of the speakers, Sir Nathaniel Barnaby, I believe it was, that it would be utterly impossible to get money for such an object. I dare say he is perfectly right in that, but nevertheless we never shall get anything if we do not try. Some three or four years ago I felt very much interested in the question, and drew up a scheme for volunteer torpedo-boats at the large ports, and submitted it to the authorities. It was favourably entertained at the time by them, but never having heard anything of it since, I suppose it has gone into the waste-paper basket. I do wish to say this—although I am perfectly well aware that these boats are most delicate machines, and that torpedo work requires an immense deal of training, and that it would be absolutely useless and senseless to put men into these boats who are not properly trained—I do believe in some of our large ports—I myself live in the neighbourhood of Southampton, and I speak of that as a typical port—I believe in the neighbourhood of these large ports you might with advantage establish one or two boats of moderate size and moderate cost; not very large boats, not very elaborate boats, not very heavily armed, and not very expensive, that might be thoroughly equipped by volunteers, and I believe properly maintained there. In all these ports you will find very skilled mechanics, men for instance working in the different shipyards and engineers' shops, and it would be perfectly easy, I am sure, to get as many of them as were necessary, very highly skilled mechanics, such men as work in Mr. Thornycroft's yard, and men of that class, and other men also, yachtsmen and men of that class. I think it would be possible, if a naval instructor were attached to them, and they went through a proper drill and a proper training of, say, a fortnight's duration each year, that you might really get a very efficient crew, and the boat might be maintained at no very great cost. Moreover, being always at the port and not liable to be called away, it would be there if it were wanted, and its stores would always be there, and the boats maintained upon the scene and ready to take the sea

at any time. I do think something of that sort might really be done at no very great expense, and moreover, I think it ought to be taken into consideration that there would be a local knowledge on the part of the crew, which I consider would be very valuable indeed. About four years ago a great deal was said about the protection of mine-fields. I believe I am right in saying I do not know that it is so now, that at that time the mine-fields of defence, such as those outside Portsmouth and places of that kind, were to be placed under the military authorities, and not under the naval. They were to take charge of the mine-fields and their protection, and it was said at that time that a number of scout and look-out boats would have to be so employed. A boat of that kind, a look-out boat, half torpedo-boat, half scout boat, might be of very great value. Supposing there were two boats attached to Southampton in the event of war breaking out, one on the look-out by the Needles, and another on the look-out by the Nab. They might be of very great use indeed, not only by what they might do absolutely in the way of protection, but they might give timely warning of the approach of vessels which otherwise perhaps might not be heard of till very much closer in. I cannot help thinking this is a subject which the authorities might with advantage turn their attention to.

The CHAIRMAN : I should just like to ask Mr. Donaldson, as he probably knows a good deal about our stokers in the Navy, whether, considering the number of torpedo-boats we should want to use, our stokers generally would require any special training for the tubulous boilers and the general work of modern torpedo-boats, more than they would readily acquire at once. I will now ask Mr. Donaldson to reply.

Mr. DONALDSON : I am very much obliged to Sir Owen Burne for the very flattering way in which he has spoken of our boats so far as he has seen them, and I have much pleasure in replying to the questions he has asked. The cost of the boats sent to India was about 12,000*l.* each, and they are insured for that amount. The actual contract price was 11,500*l.*, but there were some extras beyond that. With regard to the armament, I do not know the exact cost of the torpedo gear, as we did not supply it, it was supplied by another firm, but I think our tender was something like 2,000*l.* The crew required to man one of these boats, Officers and men altogether, would be from sixteen to eighteen ; and the coal carried about 25 tons. Two of these boats I may say are now on their way to Bombay, both having left this country. They each had 25 tons on board at starting, and that is the amount the bunkers will hold. With regard to the method of changing the steering from the forward to the after conning-tower, it is not by any means satisfactory, but I am happy to say we are not responsible for it as the apparatus was fitted at the instigation of the Admiralty, from designs which they supplied. Although we do get some good things from the Admiralty sometimes, this is certainly not one of them, and we are going to alter it ourselves in future boats. With regard to Professor Kennedy's remarks about the steering down the Pool, I think the best description of that process was given by a young lady who went down with us one day, and who told a gentleman that she had been "waltzing down the Pool." This is the most graphic description of going through a crowded Pool that I have ever heard. I do not think there is any possible protection in the way of armour for torpedo-boats. If we put protection upon them we simply hamper them in speed, and the only thing we have to depend upon besides numbers is speed. Torpedo-boats going at high speed are not easily hit, and if there is a large number there is more chance of some of them escaping. No doubt there is a risk in going into action in one of these boats, but men have done it and will do it, and when they have, in addition to the ordinary incentives of warfare, the protection of their families and homes, and their native land, I think there will be sufficient inducement for many to go on this forlorn hope. The boilers are protected by means of the coal in the bunkers, and we always endeavour, as far as possible, to have the bunkers arranged, as shown on the diagrams, for that purpose, Coming end-on, the thwartship coal bunker would be forward, and being the last to be emptied, because the doors are between the boilers, would always be a protection to the boilers and engines. With regard to the torpedo-boats being riddled, Admiral Boys has given an explanation that no water does come in when the boat

is under way. We made this experiment ourselves in consequence of what happened to a torpedo-boat that we built originally as a pleasure yacht for the present Emperor of Russia. She went up to attack a gunboat coming down the Danube, and was fired at by the troops on each side of the river. The shot must have gone through her, and we were puzzled to think why she did not sink, so we got a rifle and fired a shot through the bottom of a boat alongside our works. The result was that when the boat was stationary an ordinary bucket was filled in about $25\frac{1}{2}$ seconds, but when she got under way the influx gradually decreased until a speed of about 10 knots was attained, when no water came in at all; you could see it like a bar of glass below the hole. With regard to the sea-going qualities in respect to rolling and the difficulty of men living a long time on board these boats, there is no doubt the motion is quicker than in a large ship. It is somewhat analogous to crossing the Channel, whose short, choppy seas make people sick who, on large voyages, have a perfect immunity from sea sickness. In my paper I spoke of what might be done if the men were constitutionally fit. I think crews should be selected, and when men are found to be able to stand the quick motion of small boats those men should be set apart for torpedo-boat work and kept to that. Bilge keels we have tried with great advantage. In the last two boats built for Denmark, one of them, the second, was specified to be built with a bilge keel. In the centre there was a keel 21 inches deep, and Captain Neilsen writes to say that it gave excellent results. With regard to the stoppage of the speed it was found to be only half a knot in 23, so that it was unimportant, and we are now fitting one of the two boats I spoke of in which we are going to use 250 lbs. pressure of steam with side bilge keels in the ordinary fashion, about 9 inches deep. No doubt sea anchors would be very useful, but that is a matter of consideration for those who have the working of the boats. I am very glad to hear Mr. Baden-Powell's description of the working of a boat with double rudders. There is no doubt that boats which steer as well going astern as when going ahead are very much handier than those which only steer well when going ahead. It is quite my idea that these boats should be issued to our naval volunteers in peace-time in the same way as guns and ammunition are issued to the military volunteers, so that they may be thoroughly trained in their use, and I have no doubt that if this were done the naval volunteer service would become extremely popular from the healthy recreation which service in the boats would afford. I believe it has been proposed by Mr. Arnold Foster that these boats should not only be issued to the volunteers but that they should be allowed to use them when not required for practice, not simply as war vessels but as pleasure vessels, to go picnicing in; it all affords practice in the working of the engines and boilers, and in the management of the boats, and if the volunteers will take care of the boats I should say let them use them in any way they like. It would be a very decided inducement for men to join the force if they were allowed to go out when they thought proper in that way. With regard to twin screws in long boats like these, I do not think twin screws, one going ahead and the other astern, would do much in the way of turning, but with regard to the working separately, in the event of accident we can use any one boiler for any one engine in any way with twin screws. Sir Nathaniel Barnaby remarked about the policy of private building, I think that is a very important subject. If I may be allowed to criticize the present practice of the Admiralty, I think it would be better if the Staff confined themselves more to critical work, to getting designs in from engineers and shipbuilders in all parts of the country, for work to be done in private workshops and yards and criticizing them. If they go in for designing and constructing themselves, they simply become units among the mass of constructors, but if they become critics they place themselves in the forefront and are able to take advantage of the whole of the work going on all over the country. Sir Nathaniel has mentioned the Herreschoff boiler. I may say in connection with that, and with the incrustation of the tubes inside—Mr. Thornycroft having dealt with the question of cleaning the outside—that in the Herreschoff boiler it was found there was no deposit whatever inside; the alteration of the diameter of the tube, owing to differences in temperature or pressure, was sufficient to break up any scale forming, and the velocity of the circulation was sufficiently great to carry it away.

Of course the same thing would obtain in our boiler equally with the Herreschoff, but I think even more successfully, because the tubes are straighter. The Herreschoff boiler had a spiral tube, and ours being straight, I think the whole of the sediment would be carried over with greater velocity and would be ultimately deposited in the lower tubes as being the quietest part of the boiler. Mr. Thornycroft spoke of water coming over forward in the Indian boats. I think if Mr. Thornycroft had said spray it would have been more correct. Spray did rise up the stems of some of these boats and come over, but I do not think there was much rough water coming over. Mr. Marsden suggests that the employes of various firms would probably join the volunteer movement and assist in working these boats. I think undoubtedly they would, and the members of the Watermen's Company would be very glad to take charge of the boats in the way of steering and managing them, but they would require some small retaining fee, and possibly that might be an objection. As Sir Nathaniel Barnaby says, there is a great difficulty in finding money. I do not think there would be any difficulty in finding it, but extorting it from the Treasury is another question. I may say some of the Officers of the London corps have gone out in our boats several times, some even voyaging as far as Portsmouth, with the view mainly of getting a knowledge of the estuary of the Thames, and the shoals along the South Coast on the way to Portsmouth. Admiral Boys asked about the right colour. I do not know that any conclusion has been arrived at, but practically they are painted a dead dull black. I believe black is the best, but we have not been informed of this officially. In this respect I would say I think it would be very useful if the Admiralty were to send us any reports they might receive with regard to the doings of our torpedo-boats; we could then make improvements in future boats, and remedy any defects that might be reported. At present a boat leaves our yard and we hear nothing further about it. If anything very serious happens which they think is caused by any negligence on our part, then we are written to on the subject, but any good the boats do or how they use them we hear nothing of. I think we should be kept informed on these points. The steam launch Admiral Boys spoke of must have been a high-pressure boat, with the exhaust steam going up the funnel. No steam escapes from the funnels of our boats, as they are all fitted with surface condensers. In boats fitted with locomotive boilers, however, it sometimes escapes from the safety valves, and this, I think, is a point in favour of our boiler, as from its enormous strength we can afford to keep our safety valves screwed down to a greater extent than with most other boilers. With the locomotive boiler if you are using 130 lbs. of steam, you must keep your safety valve adjusted so as to blow off at or near that pressure; but with our boiler, if you are using 200 lbs. you can, if your engines have a good margin of strength, adjust the valve to blow off at 250 lbs., the boiler is so enormously strong, and I think this is a very strong argument in favour of our boiler as far at least as the steam blowing off is concerned. I was very much pleased to see Mr. Frank Willan here; it quite reminds one of old times, of the early days of our firm. I certainly think that using torpedo-boats as look-out boats would be most useful, and I believe was found so in the last manœuvres. Stokers in the Navy would require no more training for the use of these boilers than for the locomotive boiler, and there would be less risk of accidents happening, as the parts in contact with the fire being tubes of small diameter are exceedingly strong. In locomotives if you let the water get down very low then no doubt you would have an accident, something like what happened to No. 47 torpedo-boat, when the crown of the furnace came down. There was no explosion. The crown simply crumpled like a piece of leather and sank, drawing the stays through the holes. The whole of the steam poured down through these holes into the furnace, and had it not been that the petty officer in charge fastened up the flaps, fitted in front of the ash pan to prevent increase of pressure in the furnace, driving flame into the stokehold, which he did with the idea of getting more draught, and so increasing his chance of winning the race in which he was engaged, I believe that boiler would have been simply destroyed and no accident would have happened to the crew.

The CHAIRMAN: I am sure we shall be unanimous in returning our best thanks to Mr. Donaldson for the extremely instructive paper he has read. It has called

forth a discussion of the greatest value and interest, which will go forth in our Journal and will be of great value to all the members of the Institution and to the Naval Service. I think we may all unite in congratulating the firm of Thornycroft and Co.—Mr. Donaldson and Mr. Thornycroft are both present—on the very striking illustration the paper contains of the skill and ability that have been displayed by the firm in increasing the power of torpedo-boats during the last few years.

Friday, March 1, 1889.

GENERAL SIR FREDERICK C. A. STEPHENSON, G.C.B., Vice-President, in the Chair.

THE RELATIONS BETWEEN LOCAL FORTIFICATIONS AND A MOVING NAVY.

By Rear-Admiral P. H. COLOMB.

In a lecture delivered in this theatre on the 18th January Captain Stone of the Royal Artillery made a sort of excursus into the domain of naval action and policy, when discussing the employment of "Quick-firing Guns for Fortress Defence."¹ In laying down certain propositions with regard to the respective functions of a moving Navy and fixed fortifications, and in declaring himself a "looker on" at the game of a combined effort, or of a rival effort, between these two elements of defence, I thought Captain Stone was doing good service in challenging, *ab initio*, those who supported or denied his positions, to come out, and state their case. As I listened to the lecture and to the discussion, I came to the conclusion that probably neither lecturer nor audience had exerted the critical faculty in sufficient strength to notice how far an acceptance of the propositions put forward might lead us if we followed them up; and at the same time, I felt that under a paper with a secondary title, it would hardly be convenient to raise a full debate on primary issues.

But those who listened with me, must, I think, agree that primary issues of great moment were raised in the paper, and pronounced upon with decision in a way which does not wholly accord with some presumably careful examinations that have been recently made.

The paper on the "Naval Defences of the United Kingdom,"² which I had the honour to read here last year, did undoubtedly tend to raise the value of moving naval defence and to depress that of locally fixed defence. Captain Stone's paper, to which, so far, this is a reply, unquestionably took the opposite view, and practically claimed that "Naval Defence" was a contradiction in terms; the rôle of the Navy not being defence at all, but attack. Here, as the lawyers say, "issue is joined" and most conveniently so for discussion. It is seen that a very wide divergence of opinion is not only possible, but is in flourishing existence, on the subject of the relations between fixed fortifications and a moving Navy, and I hardly

¹ See *ante*, p. 1.

² See Journal, vol. xxxii, p. 565 *et seq.*

think we can better employ a couple of hours than by endeavouring to thrash out some of the truth as to these relations.

In the Navy I venture to think that we ought to be a great deal more critical and observant than we are on the subject of our fixed, or localized, defences against naval attack. And though I advert to the matter with the greatest possible diffidence and deference, I sometimes fear that the Army is hurting its efficiency by pressing forward the idea of strong coast works at home and abroad. I sit at the feet of Colonel Maurice so far as I form any notions of military policy, and I fail to see how such views as he expresses stand any chance of being carried out, if we are to greatly shut up the military forces of this country in detached garrisons all over the world.

With still greater deference, and very humbly indeed, I venture to say that in our military policy, I seem to detect three incompatible lines being pursued. There is the line which steadily regards the invasion of these islands, not as a possible conclusion to a series of disasters such as history furnishes us with no examples of, but as an incident of war at least as prominently near us as a great sea-fight. This line, when pursued, demands the raising, maintaining, and training of a vast body of troops on principles such as we find in continental countries, and it will ask for the fortification of London, at least, if not for converting defensible points surrounding London into a series of first class fortresses. It was this policy that dictated the great land-side works which profess to defend the Arsenals of Portsmouth and Plymouth.

The second line of policy is what I understand to be that of Colonel Maurice, where the Army is to be prepared for embarkation under the convoy of, and disembarkation under cover of, the Fleet, for those sudden military attacks at unprepared points of the enemy's shores, which the rapidity and certainty of transport over a commanded sea, makes easy for this nation.

The third line of policy is that sketched by Captain Stone, if I rightly apprehend him, namely, the dispersal of the Army all over the world in detached garrisons.

The three lines of policy would seem to me to require three separate armies to carry out in their entirety; and if I endeavour in this paper to show cause against the last of them, where my naval knowledge, and some study of the question may justify me in holding an opinion, I trust I shall not have intruded too far on military ground in mentioning the first and second.

Nothing could be more satisfactorily clear than Captain Stone's expression of view: and it is always an advantage to the solution of a controverted question to start with a clear enunciation.

"My premiss is," says Captain Stone, "that the possession of naval arsenals, dockyards, and coaling stations must practically decide the question of naval supremacy; that such supremacy is absolutely essential to our existence as a nation; and that the way to secure it is to fortify and arm our own arsenals, dockyards, and coaling stations in such a fashion as to enable them to resist an enemy's attacks, and at the same time to give a free hand to the Navy to attack those of

the enemy with such force as may be available, after providing for the patrolling of our principal trade routes, and the formation of such fleets as may be considered necessary to enable us to force on a naval engagement when opportunity offers, with forces adequate to inflict a crushing and decisive blow on the enemy."

The main view here is that the fortification of posts described will enable a given naval force to do things which it could not do were the posts left locally undefended; and a principle underlies it, declaring that naval force is not properly a defensive, but an offensive force; while military force, concentrated in localities, is truly the defence of a maritime empire.

Sir John Adye, in a letter to the "*Times*" last year, on which I had the temerity to offer some criticism, did not quite take up the *general* relations between fortified harbours and moving fleets, but he spoke of "adequate land defences of our harbours" being the "complement" of their naval defences. He presupposed, however, at least so far as our home ports are concerned, a loss of the command of the sea, and an enemy free to attack without fear of interruption from the sea. He said: "As regards land defences, I would point out, in the first place, that should this country be threatened with attack by an expedition across the sea, it is very important that our enemies should be denied access to our harbours, and should be compelled, at all events, to make their attempt on the open coast. Their chances of success will be much minimized if they have no secure base of operations." (Sir Edward Hamley used, I think, the same argument in the same way.)

"That is one point, but there are others. When hostilities arise, our vessels, whether of war or of commerce, will often require to return to port to discharge their cargoes, or to obtain supplies of coals, munitions, and food, &c. They may also have to take refuge in consequence of damages in action, or by stress of weather; and when necessity thus compels them to seek a harbour of retreat, it is essential that they should be able to refit in security, and be free from molestation."

At this point I must discriminate a little. We can see that the same view precisely does not animate the minds of two military men, one of whom brings to it the weight of experience in a long and very distinguished career; while the other must treat it by the light of a less experienced intelligence, which even a short career has shown to be of a high class.

Present to Sir John Adye's mind is a picture of more or less failure of our naval forces, more or less incapacity to protect territory by purely naval means, or more or less defeat at sea. If fortifications are necessary to "deny the enemy access to our harbours," if they are required to enable "vessels whether of war or of commerce, . . . to return to port to discharge their cargoes or to obtain supplies of coals, munitions, and food, &c.," this must either be because of the inability of a moving Navy to do it; or because the military defence by fortifications can do it equally well at a much more economical rate. If fortifications are necessary to enable ships to take refuge

under after damages in action, or by stress of weather, the conception must be that the enemy has beaten them so much as to be able to follow them up, and to be only prevented from annihilating them, or hindering the restoration of their efficiency, by the fortifications within which they have secured themselves.

These several conditions do not appear to be at first present to Captain Stone's mind. In his view the Navy is in full competence and efficiency. There is no question of its failure in any way. But fortified arsenals and ports of supply are *a convenient method of releasing naval force which must otherwise be detained locally for the defence of the ports*. It is, in Captain Stone's conception, a fundamental postulate of naval warfare, that when an Admiral leaves the arsenal from which his fleet emerges complete, for the purpose of an attack on one of those of the enemy, he must be assured that his own port is thoroughly well locally defended. And the inference is that if it is not thoroughly well locally defended, he cannot attack, for he must remain there to defend it himself.

Undoubtedly both sets of opinions as to the relations between fortified ports and a moving Navy are largely held; and the holding of them is not confined to the military service. Being largely held, it almost inevitably follows that there must be, somewhere, a certain amount of truth about them. But, on the other hand, I think it may be safely said that none of them would arise naturally out of the study of naval history. More than that, I think they do not arise directly from the reason of the thing, when we come to face it.

I rather think such thoughts are not the cause, but the effect, of fortified ports. Having observed fortified ports all over the world, we have imitated, without much close examination, that which we have seen, and applied it to our own ports; having done so, we search for and produce such *raisons d'être* as we are able, to account for their presence, and then we call in those *raisons d'être* as an argument for the extension of the system.

The importance of the question I raise, and the difficulty in dealing with it, spring from the fact that, *primâ facie*, no one denies the value, if not the necessity, of a certain amount of local defence for the ports of a maritime empire. But then no one knows where to stop. I can never forget that while many military and perhaps more naval men think that the gigantic defensive works of Portsmouth and Plymouth have been over-done, Colonel Schaw demanded, in this theatre, in December, 1886, that 833,000*l.* more should be spent upon those at Plymouth before they could be in any way considered complete. I need hardly advert to the Report of Mr. Stanhope's Committee last year. It will be fresh in all our minds that the demand for local works, both new and additional to old ones, was very large indeed, and that the actual millions taken up by loan for this service did but partly represent the view which was put forward as to the necessities of the case.

Who is to fix the degree of fortification at which the local defence of a port should stop? If an authority declares the fortification of any port is insufficient, what arguments can we use to prove that it is

sufficient? As a naval friend of mine, for whose opinion I reasonably have a high respect, has said: "There is nothing between a light battery and a first class fortress." I, myself, have generally felt that the arguments which will call for any fortification of a port against attack from the sea will equally apply to ask for its defence against all the navies of the world. I cannot tell, myself, what the measure of the defence ought to be; and the only certain check I know, upon expenditure on local defences when once we begin, is our general way of looking at it.

It does not appear to me to be of any use saying that defence by the fortification of ports and defence by a moving Navy must go hand in hand. Were they both under the same administrative control—which could only be naval control, with any reason—they might be dealt with side by side, though I do not think that even then they could be said to go "hand in hand," but as we stand they are rivals for the open palm of the Chancellor of the Exchequer, and nothing is to be gained from not recalling the fact and stating it plainly. The reason of the thing, and the history of the thing, come to my mind with a plain conviction that fortification of ports is but an inefficient substitute for their naval defence, and that as we propose a naval increase we should logically propose a fortification decrease.

But the reverse is our policy, and the moment the naval experts urge a naval increase, the military experts, and sometimes the naval ones too, are equally, if not more urgent for local port defences.

I should like to say here, that for the purposes of my argument, and to keep it clear of side issues, I wish to roll the fortification which is got out of land batteries, coast defence vessels, and submarine mines, all into one. When I speak of fortified ports, I mean ports that are locally protected against attack, whatever the means used may be. But I do not include such local and movable defences—such light vessels—as may be prepared not to defend the port itself from attack, but to warn off the roving cruizer which might seek either to blockade the place, or to capture or destroy the unarmed ships frequenting it.

I draw a distinction, in fact, between the defence of the port against attack, and the defence of the communications of the port.

As I have said above, I think the best standard we can at present erect as to the share which fortifications should carry away from the till of the Chancellor of the Exchequer, is one dependent on our general way of looking at the whole question; and I do not know that there are any proper spectacles through which we can see, except the historical spectacles.

But let me first follow up the thoughts that have formed themselves in Captain Stone's mind as consequences of the thesis used as a starting point.

Looking at the functions of the Navy he tells us that, "upon the declaration of war one of the first duties of our Navy will be to attack the enemy's military ports, dockyards, and coaling stations, and thus secure heavy odds in our favour from the outset. In order to secure the greatest results, the rôle of our Navy *must be essentially offensive*, and it is much to be regretted that an unreasonable dread of bombard-

ment should have been aroused recently by the naval manœuvres, tending to form an uneducated public opinion in favour of keeping our fleets in home waters in any national emergency. Bombardment is an operation which requires a vast expenditure of ammunition and a considerable time to be effective, and the material damage inflicted is by no means proportionate to the cost of the undertaking, or to the risk incurred in carrying it out."

We have here the development of the initial idea. Our fleets are absent making attacks on the enemy's ports, which must be, by the hypothesis of possible attacks behind the fleets, well known to be empty of the enemy's warships; these latter being, as a consequence, free to do what seems good to them. But they are withheld from attacking our arsenals because of the strength of their fortifications, and from bombarding where there are none, because of the cost and tedium of the operation.

"I will venture," continues the lecturer, "to touch upon one more naval question, and that is the question of blockade. It has been stated that to spend money on land defences, while our Navy is admittedly insufficient in numbers, strength, and speed for the duties it will have to perform, is an altogether mistaken policy; and further, that if our naval strength were increased as it ought to be, there would be little or no necessity for any land defences at all, inasmuch as the enemy's ports could be so efficiently blockaded that our shores, our commerce, our Colonies, and our coaling stations would be as free from hostile enterprises as they are in peace-time. Our recent experiences of naval blockade, when the "Warspite," "Severn," and "Iris" escaped from Berehaven, and united at a rendezvous off the Hebrides with the "Rodney" from Lough Swilly, would seem to indicate that the game of naval blockade is likely to be a dangerous and unprofitable one for the blockader, and that the blockading squadron might employ its superior strength to better purpose, and more in consonance with the fighting traditions of the British Navy, by attacking and seizing the enemy's ports and coaling stations, and thus forcing on a decisive naval engagement."

"It will, I trust, be granted that the Navy has its own sphere of action quite apart from the *defence* of ports and coaling stations, and that this duty must rest principally with the land forces."

The "Times" lately remarked that a good deal of the apparent differences on defence questions proceeded from want of clear definitions. In these passages there are two words, "offensive" and "blockade," which are ambiguous, and are differently understood. It has come about that a naval meaning has enveloped the word "offensive." It is now common to hear naval Officers speak of "offensive defence," but they do not thereby mean "attack." They mean advanced defence, and I notice the word applied both to the functions of a squadron watching an enemy in his own port, and "defending" the sea behind it, by making sure that if he comes out he will be followed and fought; and to the functions of local defence vessels, which operate in waters adjacent to a port and are ready to attack an enemy beyond the reach of the batteries.

The word "blockade" I endeavoured to show in my paper on the subject, covered three distinct meanings, namely, "sealing up," "masking," and "observing," and possibly, if Captain Stone has founded his opinions as to the result of the experiments of last year, on what naval Officers have said about blockade, he may have failed to fully apprehend their meaning on account of the varying value of the term "blockade." It is well known that Nelson repudiated the term "blockade" when applied to his long watch of Villeneuve in Toulon, and, whatever differences there may be amongst naval Officers as to the capacity of a blockading squadron to seal another up in its port, there is no rift in the general conviction that the enemy must be watched wherever he is, and followed up, for that the disruption of the Empire is certain if force enough, and of the right kind, be not provided for this purpose.

Probably all that naval Officers are certain about with regard to the escape of the ships named from Bantry and Lough Swilly is, that the blockaders had neither force enough nor of the right kind for the work they had in hand. Judgment is perhaps suspended on the point whether *any* force would be competent to seal up a determined and enterprising enemy.

Captain Stone having, as we see, laid down the functions of fortifications as *freeing the Navy*, incidentally takes up Sir John Adye's position, and imagines one of our fleets being driven into the shelter of a fortified Plymouth by a superior force of the enemy, "there to refit, coal, and await reinforcements." That means, of course, the loss of the command of the Channel; and thus having gradually advanced on the original thought of a sea left open to the enemy, while our Navy makes an attack on his land, he passes imperceptibly to the contemplation of our absolute loss of command at sea as something to be looked for in ordinary course, and as something presumably recoverable by military means.

"The case of Sebastopol," he says, "is even more instructive, affording as it does an actual parallel to cases with which we may ourselves have to deal in the event of an invasion of our territory."

Here, we must observe, that never in any war which might have partaken of the naval character was there such a collapse as the naval force of Russia exhibited. Never in any naval war was there such complete and absolute command of the sea as England then enjoyed. We see, then, how imperceptibly by laying down a certain foundation and building on it, we come to the calm preparation for a state of things impossible before the entire destruction and conquest of what we call the British Empire. Yet I admit that Captain Stone is consequent in his illustrations. It has long seemed to me that if we start with supposing, to use Sir John Adye's forcible and differentiating words, that fixed fortifications are a necessary "complement" of naval force, we must be prepared to admit that total loss of command of the sea is to be regarded as but an incident of naval war.

The conception which Captain Stone has of the Navy carrying the war to the enemy's coast, while leaving an apparently open sea behind it, has so much truth in it that it may be said to be as old as naval

war itself. But two corrections appear to be necessary before we can say that it is wholly true. I cannot stop to give instances, but the rule certainly is that a Navy cannot alone make attacks on the enemy's strongholds. Perhaps, if we take out of the list of attacks the bombardments of Algiers, Acre, and Sweaborg, we shall leave nothing behind but such attacks as have been made by the Army under cover of the Navy. I am sure, when I mention it, that the fact will start up in every mind as a familiar one, but I ought not to leave it without reminding you that the want of troops was the chief thing that paralyzed the French Navy as an attacking force in the Franco-German War.

The other correction is that the Admirals who 300 years ago recommended the policy of attack, never imagined it required fortified bases behind them. Their view was the opposite. Sir William Monson, Elizabeth's youngster and James I's Admiral, in advocating that policy, wrote, "that whilst the Spaniards were employed at home by our yearly Fleets, they never had an opportunity nor leisure either to make an attempt on us or to divert the wars from themselves; by which means we were secured from any attempt of theirs."

The historical case of this active naval policy stands thus: It cannot be undertaken at all until the command of the sea is secured—that is, until it is certain that neither the base nor the communications with the base can be threatened, and that the operations cannot be interfered with from the sea. It must always be abandoned if there is the least chance of the loss of this command of the sea.

Let me just recall that so well has this always been understood that the command of the British seas was the mainspring of all our naval wars, until a time came when it was recognized that we opened the war on the basis that we held the seas. There is positively no explanation of what was done at sea in the Dutch wars but this. It is incomprehensible that the whole naval force of each side should have gathered against the other again and again, and simply fought for the mastery, unless something was to follow it when gained. And what could follow it but the power of attack on territory as well as the control of the water? Neither the Dutch nor ourselves ever got so far in mastery at sea as to contemplate attacks on territory, for we cannot look at De Ruyter's raid of 1667, which could not be put in force until we had disbanded our Navy, as an attack. It was an insult, under cover of a not very creditable quibble. Fortification could not be said to have come into any relations with the moving navies in the Dutch wars. Neither side could attack them for fear of interruption by the other.

When, later, we fell into war with France, there was at first the same thing over again. In 1690 Lord Torrington had a divided force, and found himself off the Isle of Wight in greatly inferior strength to the French. But he perfectly understood the situation. The mere neighbourhood of an inferior naval force which was free to attack was an absolute bar to any operations of the enemy against our shores. "A strength," he wrote to the Council, "that puts me beside the hopes of success if we should fight, and really may not only endanger the

losing of the Fleet but at least the quiet of our country, too; for if we are beaten, they being masters of the sea will be at great liberty of doing many things they dare not attempt whilst we observe them, and are in a possibility of joining Vice-Admiral Killigrew and our ships to the westward.”¹

Here we have the whole argument “in little.” No conceivable arrangement of fortifications could have strengthened Torrington’s hands; there was no question of fortifications *relieving* his naval force. The French Fleet was there endeavouring to fight the English for the command of those waters, in order subsequently to make territorial attacks; Torrington could not accept battle because, if he were badly beaten, he would cease to operate as the defensive force that he was. The very object the French had in view was to drive him off the sea under territorial shelter, and therefore the provision of such shelter was not a thing to be contemplated by the Admiral. The one great fear, both in the mind of the Admiral and of the Council, was that he might have to retire north to the Gun-fleet, where his observation would be weakened; and the Council forced on the battle of Beachy Head to avoid it.² Torrington, however, saw more clearly, and he would not allow the battle to proceed so far as to leave him really beaten. By this action he won the campaign, and the French, failing to get the command of the sea, were obliged to abandon their designs.

The narrow straits in which we found ourselves, had, by the next year, given wisdom to the Council, and Russell, with a large concentrated force, fought the concentrated Navy of France at La Hogue exactly on the principles, and with the objects, of our fights with the Dutch. The French were thoroughly beaten, and ever since have commenced war with us on the understanding that they were to spend most of their time under the shelter of their fortifications, leaving the water territory to us.

Four times since then has France made preparations for an attempt to wrest this command of the sea from us, and to follow it up by territorial attack. In 1744, 1759, 1779, and 1805, fleets were fitted out to dispossess ours of their water territory, and armies were held in readiness to invade so soon as the Channel was clear. In 1744 and 1779 the fleets showed in the Channel, but dared not make good their pretensions. In 1759 the intended Channel commanders were smashed up off their own coasts by Hawke and Boscawen; while in 1805 Villeneuve failed of the nerve which was required to face the enormous risk.

In no case through all these series of operations can we bring our fortifications into relations with our fleets at all in the home waters. On the other hand, there were always the closest relations between the French fleets and the fortifications under which they sheltered themselves. Our Admirals never thought about their bases being fortified, being fully persuaded that they were themselves their defence. And the mere fact that the open anchorages of Cawsand Bay, Torbay,

¹ Entinck’s “Naval History,” p. 543.

² Mr. Laughton tells me that this was due to a discreditable intrigue of Russell’s.

St. Helen's, and the Downs, were their *points d'appui*, accounts for the absence of all expressions of doubt as to the support which might be afforded by the shore.

But I suppose the answer may be that these were the days of sailing ships, and that steam has altered all the conditions. It is right to advance the argument, provided it be followed up, but not otherwise. Experience has taught us certain plain principles of naval war, and a new factor has been introduced. We cannot say that this new factor has voided our experience, though it is proper to say that it *may* have done so, and to examine the possibility.

What is it that steam and electricity have done for naval war? They have everywhere replaced uncertainty and chance, by certainty: they have immensely shortened times, and distances as measured by times.

If, in a general way, the balance of power on a water stage of war was liable in the days of sailing ships to disturbances through the influence of the chapter of accidents; it is far less liable to such disturbances since the days of steam. There has been experience enough to confirm the dictum. Perhaps there never was so smooth and unbroken a naval campaign as ours against Russia. It was steam alone which brought it about. It is on clear record that it was steam alone which enabled the Federal States to adopt that "anaconda" policy to which the South ultimately succumbed. It could only be the conviction of the uselessness of all attempts which caused the Germans to make practically no diversions by sea in the Franco-German War. Certainly in the Chilo-Peruvian War there were cross purposes of the old sort until the "Huascar" was captured. But a naval war between two ships on one side and one ship on the other is hardly of a character to generalize from.

And so we have it that the feature of steam naval war is certainty. If it be true, as undoubtedly it is, that combinations for attack can be more suddenly and with less warning put into action; it is also true that the time which can be allowed for the attack, before it is interrupted, is very much limited, and the limit is very much more sharply and certainly drawn. With regard to fortified places exposed to attack from the sea, the general effect of steam can only have been to add to their strength, not to demand its increase. No one has yet discovered or invented a fortified port capable of maintaining itself for all time against a sea attack. Every such place as yet has fallen when attacked from the sea¹ unless relieved from the sea, provided the attack has been persevered in. And the point is that steam has made relief from the sea more certain and more speedy than it used to be. Relief which was necessary to preserve Gibraltar used to reach that fortress in a month at the earliest. It would now reach it in three or four days. An enemy, with three weeks before him, might very well proceed to the attack of a place, which he could not dream of if he had only three days before him. Suffrein, when he dared the attack on Trincomalee,

¹ Attacked from the sea, that is, as I have said in the earlier part of my paper, by combined naval and military force, the only force capable of making a determined attack.

did so because he thought Hughes was a fortnight distant at Madras. A modern Suffrein could not now attack Trincomalee unless a modern Hughes was no nearer than Suez.

But let us construct and follow up such a case, as is suggested by Captain Stone's postulates of the relations between the fortified base and the squadron which is attacking the enemy's arsenals. Let us suppose that an Admiral is bombarding Brest with ten battle-ships, and that he is enabled to do it because his base, Plymouth, is securely fortified. I must assume that, in the view put forward, there is an unmasked force of the enemy within striking distance of Plymouth, for if there be not, the fortifications can play no part. The condition of the Admiral off Brest is that he requires constant supplies of all kinds from his base; there will be a constant going and coming of store-ships and war-ships, and every now and then an injured ship going home for repair. The Admiral is distinctly told that he has his "own sphere of action quite apart from the *defence*" of Plymouth as a port, but in the middle of his bombardment he receives intelligence that five of the enemy's battle-ships—a part of his unmasked force—are lying a mile or two off Penlee Point, just clear of the Plymouth batteries. What is the Admiral going to do? Can he go on with his bombardment, while all his supplies are liable to be cut off, and his ships, in going and coming, to be destroyed in detail? It may be perfectly true that these enemies cannot long maintain themselves, though why they should not do just as he himself is doing, it is not so easy to see. But I do not think there can be any disagreement amongst us in deciding that our Admiral has no course open to him but to abandon his attack and proceed full speed after the five battle-ships that have been threatening his communications.

Yet, if this be so, the whole theory of fortifications at the base "relieving" the naval force falls to the ground. Plymouth, separated from him, is as bad—to him—as Plymouth destroyed; and the threat of separation governs his conduct in precisely the same way as the threat of destruction does. As far as I can carry my reasoning powers this hypothetical case is conclusive, and it governs the circumstances of every open port which is fortified. There remains no ground for saying that the fortification of a port which it is necessary to keep open will in the slightest degree relieve the naval force.

But suppose Plymouth in this case to have no fortifications at all. What then? I imagine it will be said that the five battle-ships would steam up and destroy the dockyard, and so do a permanent injury instead of a temporary one. If so, the Brest fleet must still come home just as before, and, therefore, there is no effect on the fallacy that the fortifications of the base, or open port, will relieve the naval force. But an inner question arises as to whether the five battle-ships *would* steam up and damage, even if it were entirely unfortified? Naval history, as far as it goes, is conclusive with a negative answer. It tells us that the neighbourhood of a possibly interfering naval force is a complete bar to any attack on the shore whatever.

Though time presses me, I cannot forbear to give some illustrations. One of our earliest entries into the Mediterranean in force was made

by Russell in 1694. The French fleet was then carrying on operations against Barcelona, but the arrival of our fleet at Carthagena was sufficient to cause their entire abandonment, and to force the French to retire to Toulon.

Next year Russell, being engaged in an attack on Palmas, 150 miles from Toulon, abandoned it on news reaching him that the French were in a condition to put to sea from that port. This instance is the more interesting since, at the very same time, we, being unthreatened by sea in the Channel were at our leisure bombarding, and in great part destroying, St. Malo, Granville, Dunkirk, and Calais.

The attempts to re-capture Gibraltar, made by the French in 1704-5, were always frustrated by the appearance of Sir John Leake's squadron from Lisbon. Twice was the attack proceeded with, and twice was it abandoned in fear of Leake's ships.

Thurot's elaborately prepared attack on the east coast of England in 1759 was prevented by the presence of the squadrons of Commodore Boys and Sir Piercy Brett.

In 1782 Suffrein was proceeding to the attack on Negapatam with land forces. The intelligence that Sir E. Hughes was in the vicinity caused the immediate disembarkation of the troops, and abandonment of the design.

Whenever it has been determined to proceed with a territorial attack capable of interruption from the sea, it has been necessary, either to mask the interrupting force, or to employ a fleet of observation as a guard against interference.

Thus, Sir George Rooke could not have attacked Gibraltar had he not been able to do it with no more than twenty-two ships, while thirty-seven formed a guard ready to engage the French if they had appeared.

When De Grasse captured the island of Tobago in 1781, almost under the guns of Rodney at Barbados, he took care not only to employ surprise in the operation, but to have such a covering fleet as made it impossible for Rodney to think of attacking him.

When Suffrein captured Trincomalee in 1782, he believed he was taking pains to assure himself that Sir Edward Hughes' fleet was at least a fortnight distant; but yet the thing was done under guard of a fleet which was capable of fighting a drawn battle with Hughes on the tenth day, the place having fallen on the ninth.

When it was determined to attack St. Malo and other places on the French coast, in 1745, an essential part of the plan was the masking of the French war-ships in Brest by Lord Anson.

In 1761, when Keppel attacked and captured Belleisle, it was a necessary element of success that a strong squadron should mask the ships in Brest.

All these lessons are found in full force as late as the Franco-German War. Then Bouet-Willaumez in command of a vastly superior fleet, yet would not risk the simple bombardment of an ill-defended coast town, Kolberg, because of possible interruption at the hands of the inferior German squadron, which was 700 miles distant.

But to make the reasoning complete, we must not omit to note that

two Commanders, and I believe two only, have been found to defy these lessons of experience—the Duke of Medina Sidonia, and Admiral Persano: the former defied the threat of the naval force at Plymouth, the latter of that at Pola. Whether a third Commander will be found to follow in their footsteps is probably questionable.

The fact that a fortified Brest and a fortified Toulon has always preserved the French fleets from our assaults is, of course, conclusive as an argument that the naval Power which has not the command of the sea, may, by means of fortifications, preserve a fleet for a time at any rate. It is a matter of fair reasoning to say that if your fleet is the most precious thing you have, even when it remains in a state of forced inaction, you can preserve it in your harbours by means of local defences of such strength as will send the enemy anywhere and everywhere before he will be driven to make his attack on the fortified ports. But we cannot forget, at the same time, that a householder can make the fastenings of his hall door so strong that the very last thing the burglar will think of will be the forcing of them. But I conceive we have established the fact that before a country can employ such fortifications at all, she must have surrendered the command of the sea, and if such command has been necessary to her empire, she must have abandoned empire.

Let us for one moment push this thought home as in the applied case of one of our fleets being beaten under the shelter of the Plymouth works. When we think of such a thing, we must, in the face of what has been said, suppose that we have no relieving fleet at hand. Were there such a fleet, it is manifest that the victorious enemy would court destruction in pursuing our beaten fleet up an intricate harbour, where it was liable to be caught by the relieving fleet. We do not, in fact, in our thoughts admit the existence of a relieving fleet. There could not be such a thing at Portsmouth, for instance. Yet the theory must be that in some way this command of the sea, which has been lost, can be regained, and be regained out of Plymouth alone. How is the fleet which has been defeated into Plymouth to come victorious out of it? And supposing such a thing possible, how long will it be before this happens, and what will the enemy be doing meantime?

It is a clear historical fact that France never tried to get the command of the Channel unless she had an army ready to make use of that command. Will she not always follow that plan, nay, is this not what we are chiefly told to fear? Would it, in any of those cases I have mentioned, have mattered the least to France whether she had driven our fleets under fortifications, or only up the harbour? Would not either process have equally served her turn? I think that when we thus press things home, we begin to see that there is great reason to doubt the wisdom of spending largely on gigantic defensive works with the idea of our beaten fleets recovering themselves behind them.

I have been considering the case of great naval bases with which it is of imperial necessity that communications should be open, and where severed communications mean loss of command of the sea,

and break up of empire as a certain consequence. These great ports do not really differ in character so far as I can see, though they differ in degree, from what are generally called coaling stations, that is, ports of supply. If we think of Gibraltar, Malta, Aden, Colombo, Singapore, and Hong Kong, we usually regard them as ports of supply for our Eastern traders, as well as for our war-ships engaged in protecting them, and without going at all beyond that thought—perhaps only including the latter branch of it—we have spent, and are spending enormous sums on the local defences of each place. What is it exactly that we are aiming at? What are the conditions we assume to be present when these works shall be brought into play? There seem to me to be but three possible sets of them. First, that the existence of the local defences shall act as such a scare to the enemy that they will never approach. Second, that we have lost the command of the sea, but could regain it if only these places are preserved to us. Third, that though the places should not fall, enterprising raiders might suddenly cut in and destroy the coal and other stores which would be, without local defences, exposed to assaults lasting too short a time to be interfered with unless every defence were on the spot.

Two of these places, Malta and Gibraltar, have had a history, and a third place of like strategical character—Minorca—brings in a history necessary to complete the other two.

The history of Malta is quite simple. France with a local command of the sea, which could not have existed in steam warfare, took possession of the place. The French losing the command of the sea, simply in consequence of the presence of a superior fleet, held on to Malta from September, 1798, for two years till September, 1800. It has never been threatened since, but we have never since lost the command of the Mediterranean Sea. The whole of our operations during our command of the Mediterranean were (unless we except the small use made of Minorca in 1799) conducted with undefended bases, generally open roadsteads.

Minorca, by the joint efforts of the Army and the Fleet, fell into our hands in 1708. It was then a duly fortified place, but we were in command of the sea. It remained in our possession till 1756. Then, as will be remembered, Minorca fell as a consequence of Byng's failure to wrest the command of the sea from the French. Coming back into our hands in 1763, we held it till 1782. From the outbreak of the war with France, in 1778, we had made no attempt to keep the command of the Mediterranean Sea. Our commerce there was of small account, and such as it was, it must have been abandoned, as the full force we maintained was but one 60-, one 50-gun ship, 2 frigates, and a sloop. When Spain declared war in 1779 there was nothing to prevent her bending all her energies to the recapture of Gibraltar and Minorca. Neither was there any relief for Minorca from the sea, and it accordingly fell in February, 1782. But again, we had restored command of the sea in 1798, and Minorca became ours once more, as soon as we desired it, without the loss of a man.

Here then are two places, Malta and Minorca, both for their time

very strong places, yet both following simply the possession of the sea. That the fortifications prolonged the sieges may be admitted, but what must also be allowed is, that these places could only be attacked by the Power which held the command of the sea. In these instances then, it seems we must narrow the functions of fortifications down to preserving the places for a limited time after the sea, and therefore the communications, has been abandoned. We cannot contemplate bringing the fortifications of Malta into actual use until we have abandoned the Mediterranean and our Eastern commercial route.

I venture to think that when great sums go into the works of Malta there is not a distinct recognition that we are preparing to abandon the Mediterranean route to India and the whole of that line of commerce.

The case of Gibraltar is full of instruction. I have already mentioned how it fell into our hands, and how it was kept in our hands in its earlier days, not by the strength of its fortifications, but by the relieving fleet of Sir John Leake, who had his base at Lisbon.

Spain being in 1780, as we have noted, in command of the sea, made a most determined set at Gibraltar as well as at Minorca. I believe we generally consider that the former place was preserved to us by its strength. We are not always reminded that what really preserved it was the employment of the whole available naval power of England in 1780, 1781, and 1782. In each of these years it would have fallen, just as Minorca fell in the last of them, had not immense fleets been dispatched to cover its re-storing and re-victualling. In January, 1780, Sir George Rodney, with fifteen sail of the line, after defeating the Spanish fleet, opened communications with Gibraltar and relieved it. In March, 1781, Admiral Darby sailed for the relief of Gibraltar with no less than twenty-nine sail of the line, near 200 victuallers, store-ships, and others. And connected with this fleet there is the remarkable fact that just about the time that it would have been off Brest, De Grasse was sailing with a great fleet and army for operations against us in the West Indies. Such a coincidence ought to make us extremely cautious in acting on the supposition that fortifications will relieve our fleets. Those of Gibraltar certainly did not in this case. In September, 1782, Lord Howe sailed with thirty-four sail of the line and an immense convoy. The fleet, engaging in a partial action with the Spanish fleet, for the third time prevented Gibraltar from falling into their hands.

We may say, indeed we must say, that but for her fortifications, Gibraltar would not now be in our possession. But we must also say that had it been necessary for us to keep up unbroken communications with Gibraltar, as it now would be on account of our trade, the fortifications would never have been called into action; and had we not for three successive years put out our whole naval strength to relieve it, the fortifications themselves would not have preserved it to us.

Again, we seem to be met by the conviction that fortifications can only represent delay. That they are not of themselves of use to

a moving Navy, as fortresses on land may strengthen the position of a moving Army by covering its flanks, &c., but that wherever communications may be given up, they may enable a place to hold out until relieved.

Some thoughts of a highly paradoxical character will intrude themselves at this point. Gibraltar was a very strong place with a very weak garrison when it fell into the hands of Sir George Rooke. Because it was a strong place it was ever after necessary to put within it a strong garrison. At a time when it was not of the slightest use to us, it exhausted our naval strength in its defence; had it not been a strong place with a great garrison we should simply have evacuated it when it was necessary to abandon the Mediterranean, just as in 1797 we evacuated the island of Elba. We should have done it in the consciousness that it would fall back into our hands as soon as we re-occupied that sea, and the place became of restored value to us.

Considering it to be merely a *depôt* for the supply of our war-ships, we must note it as an exhausted *depôt*—the shell of a *depôt*—unless we kept up communication with it. That is to say, it could not in any way have assisted us to regain the command of the sea, for we must have got the command of the sea before we could restore its value as a *depôt*. There is, therefore, a certain danger in making a *depôt* which is necessary to us too strong locally, as, should it fall—as it must if we abandon the command of the surrounding sea long enough—the fact of its strength may retard and hinder the restoration of our command of the sea. Had the Spaniards not originally made Gibraltar strong, we could not have held it when we left that sea, and Spain need not have exhausted herself in fruitless efforts to get it back again as a necessary part of her restored command in those waters.

I am only using Gibraltar as an illustration, not suggesting more with regard to that particular fortress than to say that if our communications with it are necessary, the place must be held by means of these communications and not by its isolated strength, and that the illustration governs all naval *depôts*—that is, all naval bases which are not producers of naval strength, but only *renewers* of that strength—*depôts* which in these days of steam are chiefly regarded as stores of locomotive force.

Gibraltar may not be of great importance as a naval *depôt*. In the wars of the past it certainly only shared the importance which, from the naval point of view, was held by the wholly indefensible bases of Tetuan, Lagos Bay, and Palmas Bay. But were Gibraltar once more in the hands of Spain, the necessities of our case would probably determine that if we were to retain our Mediterranean route to India and the East, we should repossess ourselves of it. It may not be of advantage to the Power whose life depends on a free Eastern highway, but it might be impossible to preserve that highway free if the Power determined to bar it were in possession of Gibraltar.

Reverting now to the three alternative functions which might be assigned to the fortification of Malta, Gibraltar, and other *depôts* on

a line of communication, we do not seem justified by history in assuming that any fortification will act as a scare to prevent the Power controlling the sea from making his attack. Secondly, we are hardly justified in supposing that if we lost the command of the Eastern route, these dépôts being still held by us would materially assist us in regaining it, though, after we had regained command, they would be of the same use to us which they are at present, and this for the simple reason that they would be exhausted dépôts when we restored communication with them.

There remains the third function of fortification, namely, the protection of the stores—the protection of the dépôt proper, and not the shell of it—from the sudden surprise and destruction which might be effected in a short time by a small force.

I think that the original claim for the local defence of our coaling stations did not go further than this. I think that if the writings of the earliest advocates of this measure are studied, it will be seen that the last thing they had in their minds was that coaling stations should, or could, stand alone. Indeed, I might almost go as far as to say that, in one prominent case, the conception now held by the general body is exactly the reverse of that put forward more than 20 years ago, and still held by him. The idea of preparation for severed communications with a coaling station, which has dominated our actual policy with regard to them, was totally absent then. The defence suggested was a local sea defence which would prevent communications being cut by anything short of a considerable force, for it was plainly felt that a dépôt must cease to be a dépôt, and must lose the whole of its value, if the stream of replenishment ceases to flow into it.

Think of Singapore for a moment, simply as a naval base. Our squadron comes in, exhausts the coal supply, and quits. The enemy closes round, seizes the colliers which would have replenished the exhausted stores, fills up his own bunkers from them, and either destroys the rest, or dispatches it to some convenient hiding-place. Our own squadron comes back, drives off the enemy, and finds an empty coal dépôt. So far as our war-ships are concerned, what difference does it make whether Singapore has altogether fallen or whether only the coal store is empty? Our squadron there is powerless, while the enemy is left in possession of the sea. The fortifications have absolutely failed to hold any relations with the moving Navy. They have not guarded its stores, and they cannot in any way assist it to recover the command of the sea.

If, on the other hand, a coal store is very much exposed, the strongest works may be passed by, and an enterprising enemy on a dark night, with good store of dynamite and combustibles, but with very little force, might in an hour or so destroy all the value which the works had been erected to guard.

I think what took place with regard to Port Hamilton gives us a most useful measure of the real naval thought with regard to the fixed defences of a purely naval dépôt. Superficially we should read it that the Navy rejected Port Hamilton as a dépôt unless it had been heavily fortified and garrisoned, but would have been glad to hold it

otherwise. And, still superficially, it would appear that the sole objection to the unfortified dépôt would have been the necessity of detaching ships, really required elsewhere, for its local guard.

But the moment we go below the surface we find the governing thought of a different character. Port Hamilton, if valuable as a naval base at all, would have been chiefly so for operations against the Russian Siberian ports, such as Vladivostock, in the event of war. But the naval instincts, resting on all the broad facts of naval history, declared that such operations required a preliminary command of the sea. That if such command existed, undefended naval bases would be established as close as possible to the scene of action, and Port Hamilton would, in consequence, fail to be of any value.

The general conclusion arising seems to be that no moving Navy has ever really laid a stress upon *fortified* bases. When it is in command of the sea it will always seize and hold convenient bases, but it will rarely, if ever, of itself, spend much on the local defence of the bases. Their defence is involved in the command of the sea. A moving Navy must either be in command of the sea, or fighting for it. It holds its command by the same tenure as an army does, and as two armies cannot command the same territory, so neither can two fleets. If in a given territory, the army of one belligerent cannot attack the fortress of the other while the army of the other is besieging another fortress of the first ; so neither can these things happen on the water.

Fortifications will shelter beaten, and, therefore, inactive fleets, just as they will shelter beaten armies. Plymouth and Portsmouth might become to our Empire and our fleets, what Metz and Paris were to the French Empire and armies—mere receptacles for shutting up force in, while the Empire was being over-run. I do not think that had we, thirty years ago, regarded them from this point of view, we should have spent as much on their local defences as we have done.

As regards commercial ports and out-ports, whether naval bases or not, I take it as plain that every nerve must be strained to secure our communications with them in war, and that it is extremely difficult to defend the expenditure of any money on local defence until the communications are absolutely secure. When the communications are secure, the provision of local defence on the supposition that they are not secure, becomes somewhat anomalous.

But, on the other hand, outlying property of very great value left very much exposed, is a direct temptation to the attack of it. A Malta dockyard without any defence at all, and capable of being got at and destroyed in a few hours by a couple of dashing cruisers, would be such a temptation ; as we might presuppose that our communications would not always be so close as to make it absolutely certain that there might not be half-a-dozen hours when no opposing cruiser of ours would be either in port or in sight.

That is one way of looking at it. But when we are dissatisfied with a Malta dockyard which we admit is a temptation only to a great battle fleet and a heavy land force, and when we propose to spend heavily on the works protecting it, rather than on maintaining communication with it, then we are, I think, looking not at the preserva-

tion of our Empire, but at its disruption. We must be contemplating the abandonment of our route to India *viâ* the Mediterranean for some indefinite time, and we must be contemplating either the ultimate loss of Malta, or the exertion of the whole of our naval power at intervals for its relief and retention, all at a time when we cannot make the slightest use of it, and are, by the hypothesis, desperately pressed elsewhere.

I should observe that all the steam wars confirm the teaching of the sailing wars, respecting fortifications. They have never stood a determined attack from the sea; they have never given, or restored the command of the sea; but they have sheltered beaten and inferior fleets, small and large, just as they did in times gone by.

But, on the other hand, Bouet-Willaumez carried on his naval war in 1870 from the wholly undefended bases of Langeland and Kioje Bay, even as we had, 15 years before, carried on ours from the undefended depôt of Nargen, and as Nelson had, 70 years before, carried it on from the anchorage of Madalena.

As I said at the opening of my paper, I did not think we could do more with so difficult a question as this, than suggest ways of looking at it. It will be apparent that my way of looking at it tends to put very great restrictions on the extension of fixed works and of local defences of any kind. I have endeavoured to look at the matter all round, and wherever I formed an opposite view, to endeavour to press it home to its consequences and see what they came to. I have not adverted much to the local defence of purely commercial ports, because I cannot shake myself clear of the conviction that it is the communications alone of these that are worth defending, and that while the ports are nothing without them, the defence of them includes, inexorably, the defence of the port itself. It is a mere instinct with me which admits light batteries at the entrances of such ports. I cannot, when I face it, reconcile their existence to my reason.

General ERSKINE: In rising to open the discussion on the very important and able paper to which we have just listened, I shall not attempt to enter into any lengthened criticism of details, but would prefer to confine the few remarks that I have to make to the general line of argument which seems to pervade the paper as well as many recent writings and utterances on the same subject. That line of argument might be, perhaps I might say boldly stated in somewhat the following way:—The construction of fortifications for the protection of our naval arsenals, and the organization of land forces for the defence of the coasts of the United Kingdom, are unnecessary. For in the event of our being engaged in war with any European Power or a combination of Powers, one or other of two things would happen: either our fleets would hold the command of the seas or they would fail to do so. In the first case, that is to say, if our fleets hold the command of the sea, an invasion of the United Kingdom would not take place, as the enemy would not dare to attempt it (we shall nearly all of us agree to that I think); and in the second case, that is to say, if our fleets had lost the command of the sea, an invasion would not take place, because the enemy would not trouble himself to land a force upon our shores inasmuch as he could bring us to submission through the instrumentality of starvation. Now, I would ask what is the logical conclusion from these statements? Is it not that we have in past times squandered many millions and organized large forces for the purpose of preventing an invasion which could never take place? And further, now that we have been brought to our senses, ought we not to dismantle our fortresses and to disband those of our land forces which are only required for home

defence? I think if such a proposal were made to the public it would rather startle them. But why should it do so if the proposal be founded on sound reason? The only answer that I can conceive would be that the public are not prepared to assent to the idea, that even if our fleet were disabled it would be possible to institute a complete blockade of the United Kingdom so as to prevent the ingress of the vessels which would be necessary to bring in our food supply. Of course even a partial blockade under the circumstances I have mentioned would be a most calamitous event: it would entail misery almost beyond description on many parts of our population; in fact, the mere thought of such an event awakens very disagreeable feelings; but as to its being the means of inducing us to at once throw up the sponge, I think that the public is not prepared to accept such a view. If a partial blockade—I am presuming that a complete blockade is not possible—would fail to bring about such a result as I have just mentioned, I think the enemy, having command of the sea, would be very much inclined to attempt an invasion, and then we should find that we had done very well if we had preserved the fortifications of our naval arsenals and the land forces on which we relied for the defence of our coasts. Those forces, if properly organized, could keep the enemy at bay at all events for a sufficiently long time to enable our squadrons to refit, but of course that would not be possible unless our naval arsenals had been kept intact all the time, and that can only be done by fortifications erected for their defence. I think, in speaking of this subject, we should not leave out of sight that it is not in accordance with the spirit of this nation, that the fact of our fleets having been worsted in the outset of a war would lead us immediately to succumb to circumstances; on the contrary, as we are pretty well aware that war is a very uncertain game, whether it be waged on land or at sea, we should be inclined to hold out till the last, and should be very glad to have for that purpose the land defences which the country has up to the present maintained in a more or less proper state of efficiency. It is not safe, I know, to utter prophecies, but I venture to predict on the present occasion that the conclusion of this discussion on which we are now entering will be somewhat to this effect—that the naval forces of this country should, in the first instance, be attended to; that they should be kept up in a state of strength and efficiency which would ensure, as far as poor mortals can control the future, our supremacy at sea; but that at the same time it would be unwise to dispense with the fortifications of our naval arsenals and with the land forces which we have now at our disposal for the defence of our coasts.

General Sir LOTHIAN NICHOLSON, K.C.B., Inspector-General of Fortifications: I must first be allowed to pay my tribute of praise to the lecturer for the extremely skillful way in which he has handled the subject. When a man of Admiral Colomb's calibre stands up and delivers lectures of this sort it is quite certain that he will be not only attended to, but he will to a great extent rule public opinion. I do not propose to follow Admiral Colomb through all the different arguments that he has used. I may shortly say that I do not agree with them nor do I think them logical. I think, in fact, that Admiral Colomb has achieved the *reductio ad absurdum*. Now, I do not propose, as I have said, to pull to pieces Admiral Colomb's lecture; my object will be more to address myself to the policy of the lecture. It is given at a critical time. At the present moment the nation is alive to the wants of its defences, and amongst naval and military men there is a consensus of opinion that what is wanted is the strengthening of the Navy. I cannot but think that this meeting will agree with me in feeling that unless the naval defences of England are secure, there is danger to our hearths and homes. But let us look at the history of these things. We have been treating the combined defences of the Army and Navy as one. For long years ignorance predominated. Time was when I joined the Service, that the naval man or the artilleryman was never asked his opinion upon the defence of this country; it was left to the engineer, and he carried it out according to his lights. Compare that with what it is now. The engineer carries out more or less the views of those men with whom he is associated. The artilleryman and the naval man are consulted as to what is requisite for fortifications; that is the condition of things at the present time. I agree with Admiral Colomb that if the Treasury fist is only open to one Service that Service must be the Navy; and I for one should most unquestionably vote that the Navy should be the one to be strengthened. But I cannot

believe that we have fallen so low that the Navy alone can be strengthened and that the Army and the defences of this country are to be starved. Now, gentlemen, what is the logical conclusion of this lecture? It appears to me to be this: that we, military and civilians alike, are to stand on the shores of our land and watch the Navy fighting the enemy, to twiddle our thumbs in anxiety that the Navy may be victorious, because, unless it is, there is nothing behind. The gallant Admiral has practically told you that land defences are of no use, and therefore it appears to me that as General Erskine has said, the best thing would be to disarm the forts and disband our Army. Now, I do not think that the country would ever listen to such a conclusion as that. In a few words I should like to say what my own view is. At the present time the defence of the Kingdom has divided itself into two parts—one is naval supremacy, the other is the protection of certain ports and certain coaling stations at the most important parts of the Empire. With the first, I, as a soldier, do not presume to interfere; the naval man alone can give an opinion upon what the naval supremacy of England should be, and, therefore, it would hardly be becoming in a military man to give an opinion upon a subject of that sort. But with regard to the second, the necessity for defending certain garrisons, and certain coaling stations, for thirty years have we been about this work: for thirty years have the best intellects of the Army and the Navy been directed towards this one point; for thirty years have Commissions sat, and I am happy to see that Lord Carnarvon is here to join, I hope, in this discussion: for thirty years has there been a Committee sitting at the Horse Guards to consider this question of defence, and upon every one of those Committees has the Navy been amply represented, and there has been a consensus of opinion as to what these defences should be. Now I ask you, is it wise to interfere at such a critical time as this with a movement which I myself believe is going forward to a very successful issue? I do not wish, as I have said, to criticize the different points in Admiral Colomb's speech. I have no doubt that there will be found plenty of people who will be able to take up and criticize the different parts of it, I have no doubt that there are some people who will be found to emphasize the objections which he has raised to the present condition of things. I myself, regarding the higher policy, should view with great regret that it should go forth to the public that there are many people in this assembly who have advocated in strong terms the views which the gallant Admiral holds. I might say here that the press is the chief organ for the dissemination of the opinions which are ventilated in this assembly, but what happens? The "Times" and other papers will publish the whole of Admiral Colomb's speech, but in short paragraphs will only be recounted the objections of those people who may raise perfectly valid objections to parts of what he has said. Thus the public hear one view of the case, they do not hear the other. In that, I consider, is a very great element of danger. There are one or two points, however, that I should like to remark upon. The gallant Admiral has quoted history, he has brought forward instances one after another to prove his case, but it appears to me that the traditions of old times are very little guide to what must take place in the days to come; I say that there is almost as much difference between the vessels of the Crimean War and the ironclad of to-day as between the triremes of the Romans and the old sailing vessels of the days gone by; I say that when the naval man of old was left his harbour, all he had to think about was that he might be safe from a lee-shore, and keep the weather gauge of his enemy; all he cared about was to make the best way he could after his enemy, and to fight him and to sink him if he could. But what is the case now? The case now is that every sailor who leaves his port must calculate upon the coal supply that he has in his bunkers. He cannot make after his enemy in the same way that they did in old days, but he must calculate the amount of coal which he will have in his bunkers when he meets his foe. Does that not alter the position of things? I think it makes all the difference in the world. Admiral Colomb has, I think, rather exaggerated the statement made by General Schaw in this room: he stated that there was £33,000*l.* required for the completion of the defences of Plymouth. Admiral Colomb has forgotten the fact that that sum comprised fortifications it is true, but it also included that which is infinitely more expensive—the armaments and the ammunition—the armaments, which is as necessary for the fleets as it is for the land defences. I must deprecate in the strongest terms at my disposal the setting forth of the pretensions

of one Service to the detriment of another, We naval and military men are addressing ourselves to one object. We do not wish to contend for the benefit of the one to the detriment of the other. We are only doing that which we believe the country requires of us; we are only trying to carry out to a successful issue all that the safety of our common nation requires, and, I think, for that reason we must do what we can to hide from the public any differences if we have them; but should we unfortunately have them, let us try by all means to meet each other on common ground; let us try to come together and co-operate as much as we possibly can for our common country's good.

The Right Hon. the EARL OF CARNARVON: Sir Frederick Stephenson and gentlemen, you are very good to call upon me to contribute what little I can say to this most interesting discussion, though, as a civilian, I naturally feel great diffidence in addressing an audience which I know is so largely composed of professional experts and men so well calculated to express a public opinion on such a subject. I had, however, the advantage, Sir, of being connected for some years with a Commission which was authorized to inquire into our defences abroad. It led me to look very closely into these questions, and I am bound to say that the opinion that I then formed does not concur with the views which the gallant Admiral has set forth with so much ability this evening. I will not of course enter upon what is really the larger half of this question, the defences of our arsenals and our own commercial ports. I am afraid I must dispose of the one by saying that they are only very partially armed, and of the second that they are absolutely defenceless at present. I would rather in the few observations which I would make speak of those foreign stations with which I myself and the very able Commission which acted with me were empowered to deal. I apprehend, putting it in perfectly civilian and untechnical fashion, the defence of the Empire consists really of two things,—the defence of our home shores on the one hand and the defence of our commerce afloat on the other, for our commerce is our life and being; and if it be destroyed our credit and resources perish with it. I fully subscribe to the doctrine which has been laid down here to-night, and elsewhere, that our first line of defence is the Navy: and more than that, I think we have been living in a state of—I hardly like to use the words that were on my lips, but I will say we have lived for some years in a fool's paradise, trading on our past reputation and utterly deficient in the necessary means of self-protection. With regard to the necessary amount and character of our naval defences, I will only say that the Commission of which I had the honour to be the Chairman, having to examine incidentally and collaterally into that subject, came to a distinct and decided opinion on the subject, and represented to the Government of the day, and consequently to their successors, that in our opinion the naval defences of the country were inadequate for the purpose, and I need not say how grave such a statement was. But I pass to a second branch of this question, the protection of our commerce afloat. Now, Sir, the view of the Commission was this: that inasmuch as there were great lines of English commerce of incalculable value, to be registered not by hundreds and thousands, but perhaps by millions of pounds in value, that it was of inestimable importance that we should hold the commanding points along those great sea routes. By some strange accident of fortune the principal of those governing points have fallen into the hands of this country, and it seems to me to be almost madness not to take the full advantage of them. And let me observe that when persons talk of the vast expense to which this leads us, I would observe this is very exaggerated language. The expense of defending these coaling stations is really of the most moderate description: and looking to the object which is in view it bears no kind of proportion to it. The estimate which the Commission made of the expense represents in round numbers not very much more than the cost of two large ships of war of the present day. I leave it therefore to the common sense of such an audience as this, whether it is reasonable to shrink from such an outlay, the absence of which may mean the loss of the best part of our commerce afloat. Now, Sir, what is it that makes these coaling stations and foreign defences so valuable? I apprehend, speaking roughly, generally you might classify them pretty much under these heads. First, it is intended by these coaling stations that they should set the Queen's fleet in these distant parts of the

world free to operate as naval policy may direct. Secondly, after an action they enable our fleets under the security of the guns of those defended stations to refit and to repair. Has anybody ever considered what the expense, difficulty, impossibility, would be of sending home from an enormous distance some of our large men-of-war in order to repair and to refit? Thirdly, it would enable the Queen's ships not only to refit and repair but to coal, and, as Sir Lothian Nicholson very truly said, coal under present conditions has become the very life of a ship; she cannot move without it, she is absolutely dependent upon it, and further, every one knows well that whereas our first-class commercial ships can carry and do carry a very large amount of coal, the Queen's ships can carry but a very limited quantity. But further, just in the same way these coaling stations afford shelter to our commercial navy, when chased by privateers or pursued by enemies, they take refuge under the guns of those forts. In the same way, too, they are enabled to coal, and if this defence be not given to them, it is almost certain that either two-thirds of the commercial marine must be laid up on the outbreak of war, inasmuch as they would not be adequate in point of speed to escape the fast cruisers of our enemies, or, on the other hand, we should see two-thirds of them transferred to a foreign flag. It must be borne in mind that in all probability the days of convoying a merchant fleet are passed. Lastly, we must not forget that defended stations have the tendency at all events greatly to deter an enemy's cruisers. A foreign ship of war will, I apprehend, think twice and thrice before she attempts to force a reasonably armed defended station. She would run the risk of injury to herself; the certain risk of a vast expenditure of her coal, and lastly the risk of an expenditure of her ammunition, and all this at a distance from her own base. On all these grounds the Commission with which I was connected thought that these coaling stations offered very great advantages both to the Queen's Navy and also to our commercial marine. But I must take the liberty of saying this, that if these forts are not reasonably equipped and defended it would be better that we should not touch them at all. On that I entertain a very clear opinion. You need for these positions not merely forts, but you need the guns to put into those forts, and you need trained gunners and garrisons to defend them: and if you are not prepared to go to that amount of preparation it is better that you should not waste time and money upon a fruitless and perhaps mischievous object. And yet as a matter of fact that I am afraid is really the present position of things. We have a considerable number of these stations in which we have gone to great expense, sometimes ourselves, sometimes by inducing the Colonial and local authorities to undertake the work for us—we have erected fortifications at a large outlay, but in the vast majority of cases we have either only guns of a very small calibre, or no guns at all; and in one case I have repeatedly protested—I have exhausted myself in protesting against the impolicy—I should say the insanity—of leaving such a vital point as the Cape of Good Hope for years and years undefended. When our Commission, to which I have already alluded, was appointed in 1879, the first question that came before us was the defence of the Cape. We went into the question, knowing its vast importance as an imperial station, we postponed every other question to press this one question upon the consideration of the Government. We did so press it: we reported immediately and fully on it, and I can truly say, I, myself, have never lost an opportunity, both in public and private, of urging it upon successive Governments; and yet at this moment, though the forts are built or building, there is practically no armament whatever in them. I do not say there is special blame to any particular Government. The blame must be widespread. The country is to blame by its apathy and indifference to dangers which, because they are not immediately visible, are disregarded; but now that the question has come before the country, I hold it to be the bounden duty of all those who can by voice or vote bring pressure to bear to use that influence to the uttermost for the common good. And now may I, in conclusion, say this, that whilst admiring the ability with which the paper which the gallant Admiral has read to-day has been drawn up, I cannot subscribe to it? I think that the gallant Admiral has attempted to prove too much. I fully admit with him that the Navy is the first line. I wish to see that Navy strengthened, and I trust to see that this new session of Parliament will not pass without a very considerable increase; but on the other hand, if our coaling stations and ports, both at

home and abroad, are not to be placed in a state of defence, then I hold that the gallant Admiral asked us to go into, not a large, but an enormous, an overwhelming expenditure for naval purposes. The absence of defended ports means a naval increase to which it seems to me difficult to set any limit. I think we are in danger at the present moment of what I may call a see-saw of opinion. We have on the one side a very able body of men who represent to us, as I believe most truly, that the Navy requires a large increase—probably there may be a tendency to carry that view a little too far, but on this I do not now argue: on the other hand, we have a body of able men who warn us of the risks of invasion, and who actually desire to surround this vast metropolis with fortifications. Sir, as a mere civilian who by your favour this afternoon am allowed to address a professional audience, I must honestly say that I believe the truth lies somewhere in a mean between the two conflicting views. I believe there is great necessity for an increase of the Navy. I believe also in reasonable defence which ought to be given to our coaling stations and home ports, and this without the loss of an hour. I hope and believe that we shall see a real and effective step made this year. We shall be probably asked for a considerable sum, but it is not only the expenditure of money that will secure the object that we have in view, but that such an expenditure should be governed by large and wise and statesmanlike considerations.

Captain STONE, R.A.: Sir Frederick Stephenson and gentlemen, it is with considerable reluctance that I obtrude myself upon your forbearance upon this occasion, but since the gallant and distinguished lecturer has honoured me by passing in review a large portion of the paper which I was lately permitted to read in this Institution, there is no choice left to me in the matter unless I wished to appear discourteous to the lecturer himself or indifferent to the issues which have been raised. The lecturer says that he detects "three incompatible lines being pursued:" with the first of these I have little sympathy; the third, alluded to as the line sketched out by myself, is not quite a correct interpretation of my views. I do not advocate "the dispersal of the Army all over the world in detached garrisons," but that naval bases of operations and coaling stations should be rendered as far as possible impregnable against a *coup de main* on the part of the enemy's fleet, and, moreover, I agreed with Lord Charles Beresford's suggestion that coaling stations should be garrisoned by marines, unless there was some reason for maintaining a military force in the locality; now I venture to think that this line of policy is not merely quite compatible with what the lecturer calls Colonel Maurice's line, but that it is an inseparable and essential portion of it. With regard to the contention that "there is nothing between a light battery and a first-class fortress," I am somewhat surprised to hear such an argument advanced in the present day, and venture to think that the "naval friend" to whom the lecturer alludes must have made the remark some few years ago in reference to the past history of fortification; if those who are responsible for our defensive works and armaments were to rely upon historical precedents to the same extent that the lecturer does, the point of the remark alluded to would be more apparent. My own contention throughout my lecture was that the accuracy of modern artillery fire and the introduction of high explosives in shells must bring into strong relief the weak points of iron and masonry permanent works and the advantages to be gained by an extended use of earthworks, since the latter are practically not more affected by the explosion of a shell containing "Lyddite" than if it were merely filled with gunpowder, whereas the terrific effect of a high explosive shell against masonry or iron is now well known, and I quoted an experiment at Port Lobos. Sir Lothian Nicholson further informed the meeting that the foregoing facts were borne in mind in the construction of all new defensive works, and that a great deal of what I had said on the subject had actually been anticipated. Again, my advocacy of light and medium quick-firing guns in earthen batteries, as opposed to any further increase in the heavy armament in protected batteries, can scarcely be said to range me with those who pin their faith on extravagant armaments. I cannot help thinking that the lecturer is stirring the embers of a bygone controversy to no useful purpose, inasmuch as the system of fortification which he deprecates has been publicly acknowledged by responsible Officers to be a thing of the past. I do not think the argument that "as we propose a naval increase, we should logically propose a fortification decrease," is quite sound, any more than I

think that the raising of a mounted infantry regiment should entail the cutting down of a regiment of cavalry, and I trust the lecturer will forgive me if I say that the impartial discussion of any question of national defence between Officers of the Army and Navy is not likely to be forwarded by impressing upon them at the outset that they are "rivals for the open palm of the Chancellor of the Exchequer." How can the Government or the country have any confidence in the recommendation of naval and military Officers, if they are led to believe that each Service looks upon the other as a rival instead of an ally, and regards the question of national defence as a scramble, in which each is to see how much he can "carry away from the till of the Chancellor of the Exchequer?" The gallant Admiral constantly makes use of the expression "the command of the sea," and admits the value of fortified coaling stations, harbours, &c., to the navy which has lost "the command of the sea." I would suggest that now-a-days "the command of the sea" is rather a large order, and that to speak of 100,000,000 square miles of navigable waters, studded with possessions of more or less value to the British Empire, as though they could be commanded with the same facility as an important trade route or a prescribed area of territorial waters, is somewhat liable to mislead; it is quite conceivable that we might temporarily lose the command of certain waters while we retained the command of others, and surely the lecturer will allow me to believe that the defensibility of our dockyards, harbours, and coaling stations, in such a case, would be of the greatest value in "relieving" the Navy. Referring now to the sketch of Singapore which culminated in the question—"So far as our war-ships are concerned, what difference does it make whether Singapore has altogether fallen or whether only the coal store is empty?" . . . "the fortifications have absolutely failed to hold any relations with the moving navy. They have not guarded its stores, and they cannot in any way assist it to recover the command of the sea." The lecturer forgets that one of our squadrons is supposed to have drawn its supply of coal already, and that if Singapore were not fortified, even this one supply could have been captured by a single fast cruiser before our squadron appeared on the scene; moreover, there is no reason why the coal store should be found empty on the return of our squadron, unless a very insufficient supply had been stored there in peacetime, or unless, owing to the incapacity of the place to defend itself, it had fallen an easy prey to the enemy's cruisers. Besides, our war-ships are not the only things to be considered, and it would make a very considerable difference to our merchant fleet, and to those at home who were depending on the supplies carried by that fleet, if it were possible for an enemy's cruisers to sink or capture the shipping in the harbour without a single gun being fired in self-defence from shore batteries. I hope the lecturer will pardon me if I say that he has unintentionally misrepresented me with regard to the Navy *alone* making attacks on an enemy's strongholds; I distinctly said that each Service required the co-operation of the other, both in attack and defence; moreover, if there is an Officer of the Royal Marines present, he may be able to inform us that the naval authorities could, indeed, undertake attacks within certain limits, without any aid from the military authorities; there is, therefore, no occasion for Admiral Colomb to make any correction on this score, as I am in perfect accord with him. With reference to the second correction, I am absolutely at issue with him, inasmuch as I think the historical precedents of 300 years ago are of no more value to the Navy than they are to the Army from a *scientific* point of view; conditions have changed since those days, and we must perforce accommodate our military and naval policy to those changed conditions; naval strategy is now dependent upon coal supply and the smooth working of complicated machinery; the first object of an enterprising enemy will, therefore, be to seize our coal supplies and take possession of such places as are adapted by reason of harbours and dockyards for repairs and refitting of machinery, &c.: the possession of such points cannot fail to exercise a decisive influence upon all future naval warfare, and we have absolutely no precedent of two or more first-class maritime Powers being engaged in naval operations under modern conditions upon a scale which would in the smallest degree foreshadow the course of events in the future. The historical method of argument is seductive, but it is full of pitfalls, and the time is now ripe in naval matters to create precedents instead of following them, always excepting the good old precedent of never hauling down our colours and not knowing when

we are beaten. The lecturer lays much stress on the difficulty of supplying a besieged naval fortress with food and munitions of war, but he ignores the fact that the blockading fleet not only requires a larger supply of the same necessaries, but also a constant supply of coal to enable it to keep the sea. What we have to fear is not a prolonged naval siege, but a sudden attack at any given point by an enemy who is in temporary command of certain waters; I cannot believe that many naval Officers will be found to endorse the lecturer's opinion that as our Navy is increased, so should our *fortified* coaling stations and dockyards be decreased, and that the formation during active operations of "*unfortified* dépôts of supply and undefended naval bases as close as possible to the scene of action" can ever be a reasonable or efficient substitute for fortified coaling stations, harbours, and dockyards all over the world, capable of self-defence, and able to afford assistance to the Navy in time of need, whether it be for repairs to machinery, to make good damages sustained in action, or to renew the coal supply. I must apologize to you, Sir, and to the meeting, for occupying so much valuable time, and crave pardon from Admiral Colomb if in my somewhat humble military position I have been indiscreet in taking too warm an interest in the affairs of the sister Service.

Captain P. FITZGERALD: It is impossible in the short time at our disposal to criticize adequately this very able paper. Admiral Colomb told us that he was going to take the position of a special pleader in the case, and in a letter which he addressed to the "Times," a short time ago, he said he was going to take the position of the "devil's advocate." I rather think he has done so. I regret that he should have taken that position, and that he should—if I may say so without any offence—have exaggerated or overrated his case, because it is a case that does not require overstating; the facts are so clear and palpable that a simple statement of the relative importance of naval and military defence for this Empire is sufficiently obvious, if set forth plainly without attempting to bring it to the point of *reductio ad absurdum*, as Sir Lothian Nicholson has said; no doubt Admiral Colomb's desire is to raise a friendly discussion between Officers of the Army and Navy as to the respective merits of their modes of defence, and it is only to be supposed that each side should take the line of "nothing like leather." But it seems to me that the case is so absolutely clear that the defence of the Empire is so absolutely dependent upon the Navy that the other side are "not in it," to use a sporting expression. I do not wish to say anything in the least offensive to the soldiers, but they are "not in the hunt" at all in the matter. I am quite sure they would not accept the rôle of standing still to fire guns from behind an impenetrable fortress. They will have their rôle in the defence of the Empire in defending India, where they will have their work cut out, but they have nothing to do with the defence of this United Kingdom, because, once it comes to fighting on these shores, if once a volunteer fires a shot in anger, all I can say is, it will be "all up," he might as well fire blank, every bit. ("Why?") Because you will be starved. ("Explain.") I will explain in one minute. I have said I thought Admiral Colomb overstated his case, and I am bound to give you some instances. I think when he pointed out the case of Plymouth, where the ships were supposed to be led away, or to go and attack Brest, and were to be cut off from their base by the enemy, he said it would be all the same to the Admiral whether Plymouth was taken altogether or whether the communications were cut. It would be all the same for that Admiral and for that particular enterprise, but it would not be all the same to the country. It would stop the particular enterprise in hand, but there would be a vast difference in the general effect on the country. And then when he goes on to point out that fortified places have always fallen when they have been steadily attacked from the sea, he forgets there are many places which have never been attacked because they were supposed to be impregnable. If it was a rule that a fortified place should be attacked from the sea and taken, why was not Cronstadt taken, or why did the naval attack fail at Sebastopol? Sebastopol was taken afterwards, it is true, but it was from the land. Also with regard to Singapore, I think he overstated his case, and Captain Stone has touched upon that very ably. Admiral Colomb assumes that one swoop is to take away all the coal and leave an empty store for the next comer. Singapore unfortified would be a supply to the enemy; fortified it would be able to resist attacks of light ships, at any rate, and to replenish our own ships when they came

there. That is all, I think, I have to say in opposition to Admiral Colomb. I think Lord Carnarvon rather missed the point when he talked about a fleet refitting under the guns of Singapore. That assumes that they are defeated. I am quite with Admiral Colomb there. They can refit in an open harbour unless defeated, but if they are defeated they get under the guns, but that means that they have lost the local command of the sea, and that all communications would be cut off. I think that these technical discussions only lead up to the main point, which seems to me to be this, that the main arteries of trade and commerce for this country are all over the world. These arteries contain the life's blood which is essential to the existence of the Empire. I won't confine myself to food. It is not a question of food only, it is also a question of raw material. There is no use in your saying, as Mr. Wilson said in a speech the other day, "I will convey food into the country; it is impossible that they can blockade us." True; but at what price, and who is going to pay for it? What is the use of bringing food in at famine prices? Are we not aware that there are 37 millions of people in these islands, and a large proportion of these, though not now at starvation point, certainly would be if you doubled the price of bread. Therefore, you are bound to be brought to your knees at once if your communications and your raw material are cut off. It is no use bringing in food if the people cannot buy it, and you are, therefore, absolutely dependent upon raw material for manufacture. Therefore, the whole question hinges itself on these arteries of commerce. If you cut a man's arteries it is a mere work of supererogation to knock his brains out, because you would have already killed him, and that is all you want to do. I daresay you all remember the concluding words of that very able digest by the Committee on the Naval Manœuvres, where, after summing up the whole case, it is said, "By her Navy she must stand or fall." In conclusion, I would venture to read you a short quotation from the "Times," in a leading article of the 3rd of January. The "Times" makes this statement, and I should like to hear this controverted if possible: "If the Navy is made thoroughly competent for its work, no other defence for these islands or for the Empire at large will ever be called into play. If the Navy fails us, no other defence will avail to avert crushing disaster." There is a plain statement, and if that can be controverted by our friends the soldiers, let it be done.

Colonel MAURICE, R.A. : The very kind reference which Admiral Colomb has made to me in the early part of his paper challenges me to say exactly how far I think we ought to expend our Army in these fortresses and coaling stations so as to lose the force which we might elsewhere employ. Now, first of all, I particularly thank Admiral Colomb for having drawn attention to that aspect of the subject, that is to say, the use of our Army in co-operation with the Navy for certain European purposes, because it seemed to me a little strange to hear a statesman to whom we owe so much in these matters as Lord Carnarvon sum up the great subject of our defence by saying that it consisted in the protection of our shores and our commerce. I think there is an omitted third clause there of great importance, and that is the protection of our great Eastern Empire and our Colonial possessions. Now my purpose, if my friend Captain Fitzgerald will allow me to be "in it at all," speaking purely as a soldier, without attempting to intrude into any question of naval strategy or tactics, has been, in the statements to which Admiral Colomb alluded, to give what is not my opinion only, but what is the absolute judgment of the statesmen of the Continent to my certain knowledge, that the Navy can, by rendering such assistance as is in its power to the armies of possible allies, and by transporting an army and enabling it to strike at certain places, not directly, but indirectly carry out that third part of the programme, and ensure the safety of India and the Colonies. It seems to me that it is vital to us that that third point, the value of the Navy and of our transporting power for the defence of India and the Colonies, should be recognized. I, at least, may claim not to have been calling out that there is nothing like leather, because in everything that I have been saying on these subjects I have been crying out for the strengthening of the Navy; and I have gone further than that, because, although I am well aware that what is most necessary in order to bring our volunteers and our home army into the condition of an effective army in the field is an increase of my own arm, the field artillery, I have

still maintained that that increase should not be made until the Navy has first had its proper share of attention ; I may say it was from Admiral Colomb, and from his brother in earlier years, and from my friend the late Colonel Home, who always showed the most eager anxiety in supporting the Navy in all these matters, that I was first brought to pay attention to these great questions of the coaling stations and our lines of commerce. As it happens, I was the Secretary of the Committee whose duty it especially was to determine the garrisons which should be assigned to those coaling stations, and I can assure Admiral Colomb pretty definitely, without touching upon any matters of confidential information, that the policy that has been adopted throughout in relation to them is precisely what both he and I wish, that is, to minimize the garrisons we detach from our active army to the very lowest possible point, trusting as far as possible to the patriotism of the Colonies for local assistance on the spot—to minimize it almost entirely to such a supply as may be necessary of expert gunners, who shall train and develop the gunnery practice of the men on the spot, and that for the single purpose of doing the precise thing which, as I have understood, both brothers have insisted upon, namely, providing such protection to our coal that we shall not be exposed to the danger of a single cruiser running into a coaling station, filling her bunkers, burning the rest of the coal, and getting clear away. That is the difficulty that must always present itself to the Navy, unless there be a change of policy at the Admiralty. Everybody who has had the least to do with Admiralty decisions in the matter will bear me out that, not once, but again and again, the Admiralty have declared that they will in no way whatsoever be responsible for the defence of ports or coaling stations, and they insist upon it that the Navy shall be kept clear for the work of destroying the enemy's fleets on the open sea, and that the coaling stations and ports are absolutely out of their charge. If the Navy intends to take charge of these ports and coaling stations, and means to be responsible for their guardianship, let it be understood that they do so, but do not let it go forth as the Admiralty says at present : " We will not send a ship to you of any kind to defend Singapore which we guarantee shall remain there. We will send you a gunship if it happens to suit our convenience, but we will not be responsible for detaining it there so as to defend Singapore." That question should be settled. I do not think myself it is a question in which the Army can have any other than one interest, and that is to have as small as possible a portion of the Army told off for the defence of these distant coaling stations, because the Army cannot be spared for their defence without detracting from its available power elsewhere. If you do not want us there, then let us get away. We none of us want to be there. But do not let there be any misunderstanding about it, and do not let us be told that you are relying upon us for the defence of these stations, when in fact you are not doing so. There is one other point which has been raised several times in a general form, viz., the present uncertainties of naval battle-action, that I want to illustrate by one specific question : I do not know how far the elaborate experiments which France has been of late making with high explosives are known to any Officers in this room, but they have been carried out with the greatest care, the most elaborate skill, and at unlimited cost ; nor is it a secret that France has so absolutely convinced herself of the power of high explosives, both against ships and in the field, that she is storing them as rapidly as she can, and spending large sums in the elaborate storage of fresh explosives, continually employed in the refilling of shells that have deteriorated, so that she always has fresh material ready for instant use. I am told at the present moment the Navy do not like touching these high explosives. I can well understand it ; there are not many of us that do, and one difficulty undoubtedly about all these matters is that shells filled with high explosives do not keep, and that you never know when you are going to run some risk with them if they have not been recently filled, or that they are not very suitable for ships like ours, commissioned for three years at a time. What I want to ask Admiral Colomb is this : is it not possible at least that for the very short move across the Channel, high-explosive shells, placed fresh on board and possessing the appalling destructive power which is attributed to them by those who have carefully tried them, may prove unpleasantly effective against a fleet of ours which, because of its duties requiring it to have on board for distant voyages explosives which will keep, has not ventured to make use of them ? Is it not at least possible

that the little blue streak of water might be cleared by them for twenty-four hours? If that is so, I want to know, do you really accept that statement in the "Times" article, that if only the danger and the possibility of invasion is upon us we are going to bend the knees at once. It is not in this case a question of our being starved, or anything of the kind. That may happen without our being starved, and without our having had our commerce seriously injured at all. I, for one, say there are more than 30 millions of us in these islands, and I do not think we mean to submit, and I do not believe the "Times" represents the feeling of the English nation that they are going to submit because the mere danger of invasion has come upon us. We must be ready on shore as well as by sea if we are not to run this risk.

Admiral Sir E. FANSHAW: I wish to make one or two observations upon what General Erskine has said, because I thought his remarks were not antagonistic to the paper that Admiral Colomb has read. He showed that if we were to do away with all our land fortifications we should do wrong; but I do not understand Admiral Colomb to have said we should do so in his paper. I understood him to say that, as has been done in former times, we ought to have means of defence in case of raids, or that any portion of an enemy's invading army effected a landing in this country. I think the two things are very much in accordance with each other. After General Erskine the meeting was addressed by Sir Lothian Nicholson. I think when he said that there was but little in former naval experience to guide us for the future, he expressed an opinion absolutely contrary to that of the Navy. The coaling stations have been spoken of a great deal, and though, I must say, I think Admiral Colomb's general principles as to the manner in which this country ought to wage naval war are sound, yet I do not think they are applicable to the circumstances of coaling stations and foreign fortresses such as Malta. We have had the advantage of hearing Colonel Maurice, who explained what the case really is with regard to these; and I entirely concur in what was said by Colonel Maurice on the subject. Admiral Colomb asked us, in order to establish the principles on which we should wage naval war, to look to past history. Everyone knows that the principles of war are not things that readily change; they lie deep, and are not variable. The instruments and methods with which war is waged vary, of course, as science progresses; but the principles remain the same. Admiral Colomb asked us to look into the history of the Navy with a view to ascertaining what our position is with regard to the strength required for the Navy. I do not think it can be denied, for a moment, by anyone who does so, that this country depends altogether to maintain the position it has as one of the greatest of the great Powers of the world, upon its having the command of the sea. If there were any question of our losing that command of the sea, we ought immediately to make the Navy strong enough to prevent it: the loss of it is not a thing to be allowed: it is that on which the existence of this country depends—as a great Power. Admiral Colomb went through the history of the country, and referred to many cases to enforce this. Taking the crucial instances when the war operation in contemplation was the invasion of this country, he mentioned four within the last 150 years. The two most important were those in the Seven Years' War in 1759, and the great endeavour of Napoleon. They show that the military opinion of those who undertook them was, that the only way to do it was to prevent us from having the command of the sea. I should not care to refer to the first one at any length, because the second is much more important; but from the first one we may learn what this country can do when it is ruled by a Minister who understands and thoroughly grasps the fact that it is his business, and a great proof of his statesmanship, to wield and to apportion the various portions of the war resources of the nation. They will see what we can do when that is the case, instead of its being left to the two Departments to settle between themselves. I now refer to the last great attempt at invasion under Napoleon, claiming as his opinion, being that of one of the greatest masters of war the world has ever produced, that this country was not to be invaded until he had acquired from us the command of the seas where his invasion was to be carried on. He had an enthusiastic army which he had trained for years for the purpose; but he could not get the command of the sea away from us, and he therefore failed. I think anyone who will consider that instance will find sufficient reason for saying that it is absolutely necessary that we should allow no question

whatever about our having the command of the sea, as far as such a thing is possible to be made mathematically certain. Sir Lothian Nicholson thinks that it was to be regretted that such a paper as Admiral Colomb's had been read, because the Press will publish it; and the public will only hear one side of the question, because the paper will be given in full, and the discussion will be condensed. But the very *raison d'être* of Admiral Colomb's paper, from its first paragraph, is that certain statements had been made in a former paper, written by an Officer on a detail of one branch of military science, viz., arming batteries with quick-firing guns. A great part of that paper went into the fundamental rules upon which the whole armed force of this country are to be employed in war. I myself, when I heard the arguments, thought them beyond measure unsound, and to indicate that that Officer was not very well acquainted with the history of the wars which this country has been engaged in during the last two centuries; and I very much regretted that it should go forth from this Institution without some reply; but I felt that we were then discussing quick-firing guns in batteries. But the opinions expressed in that paper have gone forth to the country, and I think it was quite right that they should therefore be discussed here. Now, with regard to the value of the past history of the Navy as a guide to the future, we should recollect that, included in naval history, the Army has got a very glorious history. I should like to trace that glorious history of the Army through its annals. I would go back as far as the war of the Spanish succession, which rendered immortal the name of Marlborough. There was an English army on foreign soil. How was that army supplied? That army was supplied because we had obtained the command of the sea at the Battle of La Hogue. Go on to the next great war—the Seven Years' War. The brilliant exploit of General Wolfe, which ended in the capture of Quebec, was rendered possible by our having the command of the seas, to maintain which large fleets blockaded Brest and Toulon. The Battle of Plassy was won by Clive; but this would never have been fought if Admiral Watson had not been there with his fleet to protect and co-operate with the army. In the next war the great operation of the Army was the defence of Gibraltar, which Admiral Colomb has referred to. Look at the wars of Napoleon. The brilliant expedition to Egypt was only possible on account of the command of the seas having been previously obtained by the Battle of the Nile. I need not dwell on the Peninsular War, which was rendered possible by the absolute command of the sea having been confirmed at Trafalgar. These are facts in which I think our friends of the Army must recognize that those brilliant achievements which have distinguished their Service so greatly for the last 200 years have been possible because we held the command of the sea.

[The discussion was then adjourned to 4th March.]

Monday, March 4.

ADJOURNED DISCUSSION.

GENERAL SIR FREDERICK STEPHENSON, G.C.B., in the Chair.

Lieutenant-General Sir GERALD GRAHAM, V.C., G.C.M.G., K.C.B.: Sir Frederick Stephenson and gentlemen, whatever may be the merits of Admiral Colomb's interesting paper as a sample of sound reasoning, there can be no question as to its ability, and as to its having proved most valuable in eliciting expressions of opinion from competent Officers of both Services, though I think the public will naturally attach more importance to the opinion of a naval Officer who differs from Admiral Colomb, as all have more or less hitherto, than to that of a military Officer like myself. I think that all who wish well to the defences of the country, and I include the gallant Admiral, although an adversary, have reason to feel grateful to Lord Carnarvon for the admirably clear statement he made at this Institution at the previous meeting, and that we may feel some confidence in the decision of a Commission of which he

was President. Although I disagree utterly with the gallant Admiral's conclusions, I cannot resist a certain feeling of admiration for his perfect confidence in the power of our Navy to keep the command of the sea under all circumstances as its inde-feasible right and attribute. This, however, seems to me very much as if a General started with a plan of campaign—the phrase is rather in bad odour just now—the successful execution of which depended on his winning every battle. “Rule Britannia” is a very fine song and we have often joined in the chorus, but when we meet in this Institution we ought to put sentiment on one side and look facts soberly in the face. I should like to hear from Admiral Colomb what this ideal command of the sea means under present conditions, and according to his theory of defence by a moving navy. What fleets would be required to secure our coasts, communications, and commerce against the greatest probable or possible combination of naval Powers? What would it mean in money outlay and annual expenditure? Finally, is it practicable or only a dream? We know on the best authority that at present we should be decidedly inferior to a combination of two great naval Powers; nevertheless, Admiral Colomb bases his whole theory of Imperial defence on our being everywhere superior at sea. With this assumption of conditions which do not exist, Admiral Colomb regards the fortification of our arsenals, dockyards, and coaling stations as unnecessary, for, far from being factors of strength to our naval power, they weaken it by taking money which ought to be expended on the fleets. In short, the Navy is to undertake the defence of the United Kingdom and of our lines of communication and commerce, and it is too confident in its invincible power, according to Admiral Colomb, to need any reserve, so that, as clearly stated by General Erskine, all our land defences may be dismantled and our reserve forces of militia and volunteers disbanded. I was glad to hear this condition frankly adopted by Captain Penrose Fitzgerald, R.N., though the gallant Officer's statement was received as an excellent joke, as it emphasized what Sir L. Nicholson called a “*reductio ad absurdum*,” though I cannot say if this was the point Sir Lothian had in his mind. We may be on the eve of a very critical epoch in our national history, and the mind of the country, and therefore of Parliament, seems at last awakening to the dangerous state of our defences, and we must consider the probable effect on the public mind when it is known that an eminent Naval Officer, speaking with weight and authority on the naval armaments of the Empire, gives it out as his deliberate opinion that our policy of defence for the last thirty years has been utterly wrong. I may be mistaken, and sincerely hope I am, but I cannot help fearing that this paper may do harm by obstructing the efforts of patriotic statesmen like Lord Carnarvon, who ardently desire to bring the pressure of public opinion to bear on the Government to complete the defences of our ports and coaling stations. When the public sees its naval and military experts at loggerheads on the first principles of defence, it does not care to go into the merits of the arguments; the effect on the British taxpayer is to make him button up his pockets. I trust, however, that John Bull will, on this occasion, keep his eyes open and see what the arguments of the gallant Admiral lead to. The average English citizen reads his daily paper, but does not have a very clear conception what a coaling station means, and if Admiral Colomb tells him it is quite unnecessary to fortify it he may say, “Well, the Admiral must know more about naval wants than a mere military man, therefore let us save the money.” If, however, the same man is told that to follow out the Admiral's views, the citizen army, of which he is justly proud to be a member, must be disbanded as useless, he gives up his faith in the Admiral at once, at least on this question. I have only time to touch on a few points in Admiral Colomb's paper, and he has frankly invited the severest criticism. I may be allowed to express astonishment that with so bad a case so good a paper has been produced. The Admiral has given us leave to fire away, and no doubt he will stand heavier shot than I can bring to bear against him. I trust, however, that nothing I may say will be held inconsistent with the respect I feel towards the Admiral and the courtesy which is his due. It is surely a somewhat strange argument against the fortification of a port that once you begin you don't know when to stop, that as Admiral Colomb's naval friend, of whom I desire to speak in terms of the utmost respect, puts it, “there is nothing between a light battery and a first class fortress.” It would almost seem as if the two gallant Officers, in their desire to run down the fortification of ports,

had wandered somewhat into the hazy regions of philosophy, and started a new theory of evolution analogous to that of the development of species, by which we learn that man has, by imperceptible gradations, been evolved out of a mollusc. Given a mollusc, and by process of development you must get the man if you wait long enough; or, as here stated, given a light battery, and in process of time it will develop into a first class fortress. Further on, the gallant Admiral seems troubled with a yearning after an ideal fortification, and on page 5 he writes, more, I hope, in sorrow than in anger, "No one has yet discovered or invented a fortified port capable of maintaining itself for all time against a sea attack." Certainly not. But is that a reason for abolishing fortified ports? This is logic with a vengeance—"No fortifications are perfect; imperfection is undesirable; therefore have no fortifications at all." I am afraid that even Her Majesty's ships and guns, down to our swords and bayonets, are not perfect, yet we must continue to use them. Admiral Colomb tells us that "fortification of ports is but an inefficient substitute for their naval defence." Now I beg to demur to this statement altogether, as fixed fortifications never can be regarded as a substitute, efficient or inefficient, for moving naval defence, which is what the Admiral means. On this mistaken premiss the Admiral infers that as we propose a naval increase we should logically propose a fortification decrease. I would, if I might do so without offence, beg to suggest the prefix "il" before "logically." The gallant Admiral frequently appeals to logic, but he will excuse me for saying that he is not always logical in his statements. Thus, at one part of his paper he states that he draws "a distinction between the defence of the port against attack and the defence of the communications of the port;" yet, further on, in the cases of Plymouth, Singapore, &c., he falls foul of the fortifications for not protecting the communications, which is surely no duty of theirs. He will not allow that five French battle-ships lying off Plymouth could bombard the Dockyard, even if it were totally unprotected with fortifications, because of the presence of ten English battle-ships at Brest, 200 miles off: yet in another part of his paper he admits that Malta Dockyard, supposing it were undefended, might be got at and destroyed in a few hours by a couple of dashing cruisers. One remarkable feature in this, noted by Captain Fitzgerald, is that the Admiral seems indifferent whether Plymouth is destroyed or not. On this point Captain Fitzgerald has already bombarded the gallant Admiral, and therefore I will say no more. He is compelled to admit that, "but for her fortifications Gibraltar would not now be our possession," yet goes on to assert that under present conditions they are useless. This seems to me playing fast and loose with the historical argument. Surely if naval history teaches us anything it is that our fleets were constantly losing local command and regaining it. If these periods of loss were short, the ports, if fortified, held out; if long, they fell; and by the Admiral's statement the periods for relief of blockaded ports would be much shorter with steam, so that fortified ports would have better chances of holding out. The gallant Admiral has endeavoured to show that the fortifications of Singapore are useless. Captain Stone, followed by Captain Fitzgerald, have ably shown the fallacy of his reasoning, but I feel on safer ground in quoting the opinion of Admiral Sir Vesey Hamilton, who stated in May last, at a lecture given by Admiral Colomb, "The great thing I had to fear when I was in China was this, that until the guns for the ports were sent out the Navy had to defend the ports of Singapore and Hong Kong. Now that Singapore and Hong Kong have got their guns and are defended, the Admiral in China is left free to defend his commerce." No more authoritative statement is possible. It comes from an eminent naval Officer, with all the weight of authority due to experience and the responsibility of command. He states distinctly that when ports are defended the Navy is free to protect the commerce, and I would wish that wherever Admiral Colomb's paper is read, this plain tale of Sir Vesey Hamilton's should be read also. One word more as regards the historical argument. Like Sir Lothian Nicholson, I cannot help fearing that the experience of former naval wars is an unsafe guide for the future, and much as I admire that spirit of confidence in the British tar, which has carried our flag victorious over every sea, I cannot help seeing some danger in it. The storage and protection of motive power must now control naval strategy, and I leave it to naval Officers to tell what a complete revolution steam has caused in naval tactics. History tells us that overweening

confidence has frequently led to national disaster in another generation. The glory of Frederick the Great was dearly paid for at Jena, and that of Napoleon the First at Sedan. Before I sit down I wish to add my protest against the notion which this paper rather tends to encourage, that there is any spirit of antagonism or unfriendly rivalry between the Army and the Navy ("No, no"), that the Army should be represented as in some way supplanting and robbing the senior Service. I do not admit that any such feeling exists in the Service to which I have the honour to belong. We are all proud of our Navy: we regard it as our first and most important line of defence. My experience has been that when we are serving together we do so heartily, and without jealousy or rivalry, working together as good comrades for the honour of Old England, and our wish, as that of all true Englishmen, is to see our Navy strong, and, if possible, mistress of the seas as of old.

Sir JOHN COLOMB, K.C.M.G., M.P.: In the few minutes which are allotted to each speaker it is really very difficult to cover the ground and at the same time avoid being misunderstood. I think the best hope of accomplishing the duty of discussing, without being misunderstood, in so short a time, may be to find some point on which we are all agreed. I believe that we are all agreed, at all events, upon this, that the title of the paper is the "The Relations between Local Fortifications and a Moving Navy." Now, of course, we may stray very far away from that; but there is another point upon which I think we are all agreed, soldiers, sailors, civilians, and all alike, that our moving navy must be sufficient to do its work. Then my next point is, what is that work? I think it may be thus shortly described—that its work is to paralyze the power of a hostile moving navy to do us great and serious mischief. Therefore the main issue raised by the paper appears to me to be this, to endeavour to elicit discussion, and, if possible, to scientifically determine what are the relations of our local fortifications to a hostile fleet, the power of which to do us great and serious mischief has already been paralyzed by the sufficiency and efficiency of our moving navy? Before dealing with the paper itself I would say a few words in attempting to criticize the criticisms that have been offered. In the first place, it is pointed out by our gallant friend General Erskine, that if we command the sea certain things will happen; but I take commanding the sea to mean that our moving navy is able to do its work, and if from the fact that the Navy is able to do its work, invasion is impossible, we cannot help it; and if public opinion, as the General said, won't believe it, even if true, we cannot help it. What we really have to do in this Institution is to endeavour to get at the facts and the truth. Then our excellent friend Sir Lothian Nicholson drew a very gloomy picture of the result of our moving navy doing its work; in other words, commanding the sea; he pictured the militia and volunteers twiddling their thumbs. That we cannot help. I must agree with him entirely in this, that our soldiers in this great Empire must do their work, but I assert they cannot do their work unless the Navy does its work first in commanding the sea. He said that as a military man he could give no opinion upon naval affairs, and he next, very kindly and good-naturedly and most courteously, hitched up his trousers, metaphorically speaking, proceeded to take the weather gauge of the meeting and to pronounce a naval dictum, which he afterwards explained—that the Navy had no history. Well, I understood him perfectly to mean that, in his opinion, we could not now rely upon history to instruct us with regard to modern naval war. I am sure he won't take it personal if I venture to think, in my own humble way, that he is entirely and absolutely wrong in that sense. I say, Sir, that steam has no more obliterated the teachings of history in the Navy than it has in the Army, and that the influence of steam in extending the area and possibilities of military warfare in land operations is quite as great as the influence of steam on sea operations. In obliterating the teaching of naval history, is he therefore prepared to obliterate military history? Now I come to the next speaker, who rather surprised me, Captain Stone, who said he did not advocate locking up our Army in detachments all over the world, but he did advocate all those places being impregnable. I confess I am puzzled at this declaration of the speaker. How can you get detached impregnable local positions without detached military forces? And I say that they will be locked up forces if we do not command the sea. The next matter I come to is this. He indicated in rather a depreciating way that we

must abandon the attempt to command the sea, for he said the command of the sea was a very large order. Well, Sir, the British position in the world is itself a large order and makes very large demands, and if we are to preserve our position in the world we must not shirk facing the demands that our position makes upon us. Then we had my cheerful friend Captain Penrose Fitzgerald, who plaintively informed the soldiers that in war they would not be in the hunt. I heartily agree with him, if Captain Stone's view be adopted, because they will have no horses unless the Navy commands the seas. Not a drummer boy can be moved. All I can say is, that the Navy is the covering force for the transport of the Army. Now, I come for one moment to a speech that was listened to, as it ought to be listened to, coming from the source it did—from Lord Carnarvon, and I confess that I thought it dealt more with the special question submitted to him in 1879 than with the question we are discussing here. I think it was unfortunate that a noble lord of his eminence should have publicly announced in this theatre that this Empire had in war only two things to do: one being to protect our own shores—the shores of these islands, and the other the protection of commerce. I protest against any Englishman leaving out of account the duties and responsibilities of this Empire with regard to her frontiers over sea, and our great Indian Empire. Lord Carnarvon, in concluding, apologetically remarked that if my brother's and my own views prevailed, we should require an enormous fleet. I should like to read to the meeting what Lord Carnarvon's opinions were, as Chairman of the Commission, as evidenced by the Report of that Royal Commission of 1879. Here is the Report. It speaks of "the necessity of maintaining, not only a fleet sufficient in number and in power to give *absolute security* to the sea-board of the United Kingdom, but also to provide fast vessels, so stationed as to be ready at the commencement of hostilities to deal with the enemy's ships in more distant seas. We, the Commissioners, feel bound to express our opinion, on looking to the action of other countries, that the strength of the Navy should be increased with as little delay as possible." I call the attention of the meeting to the words "*absolute security*" by naval means. Lord Carnarvon, in 1879, as head of that Commission, demanded a fleet sufficient to provide "*absolute security*" for our shores and for all our maritime wants. I will only say that, to take the reverse side of the picture, if you do not provide that fleet, this, to my mind, is certainly true—this Empire is gone, and the moral effect alone of the fact that your command of the sea is gone will extinguish all margin of possible profit, which means the closing of your factories, the shutting up of your industries, the cessation of the operations of your Stock Exchanges, your shops, and your counting houses. I say distinctly, in my humble judgment, it comes to this, that if your moving navy is not able to do its work, the position of some forty millions of people in these islands will be the position of so many rats in a trap. I agree with my brother in his main contention, and I think his paper was called for, because I am one of those that for many years have felt that while on the one hand in the past we were absolutely neglecting to give any local protection at all to our naval stores at different points, on the other hand, we have now swung round, and we are now too much tempted to spend too much money on, and to over-do local defences. I am not prepared to go quite so far as his paper appears to me to indicate, but I can quite conceive, putting myself in his position, and looking at the necessities of the time, that really in order to raise a distinct and clear discussion you would have to push your advanced posts of argument perhaps a little further than you might otherwise be inclined to do. Therefore I say, that while I agree absolutely in his main contention, he does go a little further than I myself am prepared to go. If we exclude all else but actual war-ships from the conditions of war I think I might be prepared to accept almost an extreme view; but I am not prepared to exclude from the conditions of maritime war all else but war-ships. I look at local means of defence, at naval bases, and coal depôts, as necessary to prevent the destruction of the docks, coals, and stores of our war and mercantile ships by raiders, because I think raiders are in this case your primary danger, and also the facility that steam gives for the rapid, certain, and sudden movement of troops from mercantile ports. I have said already I do not think steam has altered the conditions of naval strategy, but I think it has extended their application; and what it has done, and what I think is the most serious

modern element affecting our defensive position is this, that it has opened up and added to the problem of maritime defence, and has increased the power of improvised attack outside moving war navies. We, I think, of all nations must recognize that fact. I will take the case of Singapore, and I will point out that while I quite agree with the contention of the lecturer that it is useless to defend Singapore unless you are prepared to defend the local waters around it, I say that taking his illustration of the secure Singapore, and the colliers being captured outside, that is not so bad a position as the coals in Singapore being destroyed and the coals outside being captured also. I am bound also, in dealing with this question, to mention one illustration of history which I dwell upon many years ago, namely, the case of the Mauritius. The Mauritius was held by the French years after the Battle of Trafalgar. It was found that it was a hornet's nest from which privateers issued, and it was determined by the Governor-General of India that this must cease as it was ruining trade. We really commanded the sea, and the Duke of Wellington, then Lord Wellesley, was sent to Ceylon with a large force of troops for the purpose of seizing the Mauritius. Admiral Rayner, I think, commanded the fleet to cover the advance of these troops on the Mauritius. A difference between the Admiral, who declined to go, and the General, who was ordered to go, brought matters to such a state that they had to abandon the expedition altogether, because the Admiral did not agree with it. So the ruination of our commerce in that sea went on; but later the naval authorities in the district found they must root this place out, and they sent a purely naval attack against the Mauritius, with a result that was terribly disastrous. Years afterwards we made a combined military and naval attack; we took the place. I point that out as showing that in all these matters in connection with naval bases you come at last to a combination between the Army and the Navy. That is very briefly my view. I cannot venture to detain you much longer, but looking at the duties and responsibilities of our whole Empire, and seeing what the action of the British public is, and that Parliament will not open its eyes, we are bound to fulfil the primary condition of our existence, that is to maintain the command of the seas; but having that, we are not to run away with the idea that we have then discharged all our duties and obligations. What I am most concerned in disputing is the exaggerated proportions of the modern doctrine of local fortifications for the release of our fleet. I think our true safety lies in this: that our docks, stores, coals, and offings must be locally secured against raiding attacks, that our Fleet must command the sea by being strong enough to paralyze the power of hostile war fleets, and thus to secure the release of our Army for defence of our frontiers abroad and for descent on the enemy's coasts.

Major WALKER, R.E.: I shall be glad to be allowed to join in the congratulations to the lecturer for his very able paper—a paper, in fact, so able and so clever that it has almost persuaded Admiral Colomb himself against his better judgment. I will read the two last lines of Admiral Colomb's lecture, in which he says: "It is a mere instinct with me which admits light batteries at the entrance of our ports. I cannot, when I face it, reconcile their existence to my reason." In his lecture Admiral Colomb has constructed a keen logical weapon for the overthrow of fortifications; but he has not convinced us. In his last lines he admits light batteries for the defence of commercial ports. I think that he has written two lines too many in his paper. In a previous page Admiral Colomb says there is nothing between a light battery and a first-class fortress; so that we are to have a first-class fortress for the defence of every commercial port! What, in Heaven's name, then, are we to do for the defence of Plymouth? I think that is a point that Admiral Colomb ought to answer. Then there is another point. General Erskine stated that the lecture practically amounted to this, that we must disband our land forces and dismantle our fortresses. The lecturer dissents from that; but Captain Fitzgerald told us in very forcible language that, "You are out of it; you are not in the hunt, you soldiers. The first shot fired by a volunteer in anger means not the commencement of the decadence of the British Empire, but its complete destruction." That, I think, is letting the cat out of the bag rather as to what the meaning of the lecture is. It means practically the complete destruction of fortifications—that we do not want any fortifications. Now, although another gallant Admiral told us that we had a glorious military history, I do not think that that glorious

military history will make up to us soldiers for having lost all present usefulness and all hope of future distinction, which we have lost, if Admiral Colomb's lecture is sound. Captain Fitzgerald put it very plainly. He said, "You have India; you are a *depôt* for India; but you are nothing else; you are merely a *depôt* for the defence of India; that is your only hope, your only *rôle*, for the future is to defend India." I admit that the defence of India is a very glorious task, but it is not the defence of the British Empire. We have sailed with the Navy all round the world; we have, in company with the Navy, swept the seas around the world in the acquisition of the British Empire, and I do not think we want to give that up yet. I think Admiral Colomb has rather created a structure which he then proceeds to demolish, and in the ruins of this child of his own imagination he has hoped to bring down fortifications also. He says Captain Stone's third line of policy is this: "The third line of policy is that sketched by Captain Stone, if I rightly apprehend him, namely, the dispersal of the Army all over the world in detached garrisons;" and then at a later part of the lecture the Admiral gives us his own views. He says, "There remains the third function of fortification, namely, the protection of the stores—the protection of the *depôt* proper, and not the shell of it—from the sudden surprise and destruction which might be effected in a short time by a small force." Then he goes on to say, "The original claim for the local defence of our coaling stations did not go further than this." But supposing that Captain Stone did make that proposal, did propose that policy—I did not clearly catch what Captain Stone said, but I believe he said he did not intend that—but supposing he did intend that as being the one line of policy, has anybody adopted it? Have the authorities who are responsible for the defence of the Empire adopted it? Certainly not. There is no such idea. The defence that is now being carried out is practically a minimum defence. We have actually adopted Admiral Colomb's own idea altogether. We have no other idea; we dream of nothing else. I do not imagine that the fortifications of coaling stations are to go stalking over the sea and contending with the enemy's cruisers. I contend the defence of a coaling station is to be what Admiral Colomb wishes it to be—purely local defence for the protection of the stores and of the stations themselves. There are some other points I should like to mention. There is a minimum defence, and when Admiral Colomb speaks of a large expenditure on gigantic works of defence, I very humbly think that he must have had in his mind the British line-of-battle ship, which is the only gigantic defensive work that I know of, the only one that can at the present moment cost any very large sums of money. Our work does not cost very large sums of money, for the very simple reason that we do not get very large sums of money to spend upon it.

Captain FITZGERALD: Where do the 16,000,000*l.* go against our 12,000,000*l.*?

Major WALKER: It is impossible for me to answer that point without notice. I have only been able to pick out a few points, and, for reasons that will be obvious from the position I hold, I have carefully avoided figures. I might have been told that I was trenching upon things with which I had no business to interfere: therefore I must ask Captain Fitzgerald to allow me not to quote figures. Take Singapore. Captain Fitzgerald has pointed out that Admiral Colomb assumed too much when he assumed that a squadron, after having coaled, had exhausted all the benefits that can possibly be obtained at Singapore. Captain Fitzgerald pointed out that there would remain a large quantity of coal still safe. I am trying to get at the relations between fixed fortifications and a moving fleet. You have there a quantity of coal: your fleet coals up, and, I presume, would have to go away to carry out their proper business. You evidently intend that the fleet is to go away from Singapore; but if there are no fortifications there a fleet cannot go away: the fleet must stay and protect the coal. On the other hand, if the port is protected by a few light guns, the fleet will be at liberty to go away and follow its own vocation of protecting commerce; and although the enemy's cruisers may, and no doubt will, interrupt the supply of coal, still they cannot destroy the coal already existing in that port.

Captain FITZGERALD: May they not take the coal with them?

Major WALKER: That I leave naval Officers to say. My point is that there will be some left to protect, and you must have something to protect it. That is the

minimum defence; but there must be some defence, or you will lose your stores. I am now looking at it from a naval point of view only; but is there nothing on the sea except Her Majesty's Fleet? Is not the primary reason of the existence of Her Majesty's Fleet the protection of the trade routes and of commerce? And if the fleet goes away and leaves Singapore undefended, what will happen? If it leaves it defended, then a commercial vessel, chased by cruisers and hampered by the enemy, will run into Singapore and obtain shelter under its guns. Will it not be better, when Her Majesty's ships come back to Singapore after their cruise, to find instead of a line of blackened hulks along the shore, a line of trim merchant vessels lying at anchor safely under the guns? I think there is a case in which the existence of fortifications does free a fleet. There is another question—about Malta. Admiral Colomb admits the necessity for the fortifications of Malta: he admits the importance of the dockyard of Malta, and he appears to me only to object to its being any further strengthened. I so read the paper. There is a very small amount of work being done at Malta at a very small cost. The fact is—and I think I may say so much without saying anything wrong, or revealing any secrets—that the opinion of every Officer who is officially, or ever has been officially of late years, resident in Malta, is that this slight increase is not only a good thing but an absolute necessity, if the place is to be defended. Then can you for a moment say that this slight addition shall not be made to a fortress to bring it up to equality with modern armaments simply because it now needs a large fleet to take it? I do not think it does need a large fleet to do it any damage. There is another point about Malta. It is said that no port could ever resist an attack from the sea. Upon that I will simply name Cronstadt and Sebastopol. Again, Admiral Colomb asserts no attack is possible where there is any fear of interruption from the sea. I take the Admiral's own instance—Tobago—where an attack was successfully made under cover of a fleet; but can you say you will never lose the command of the sea locally to some extent, as you did at Tobago? There, again, is the case of Trincomalee. Then there is the case of Gibraltar. Surely the case of Gibraltar is clearly in favour of fortifications. We regained the local command of the sea, and Gibraltar was relieved: we lost it again, and Gibraltar was again attacked. Now, had not Gibraltar been fortified it must have fallen. The possession of a fortress does *not* follow the command of the sea. The French held Malta for two years after we regained possession of the Mediterranean—and Malta is an island. If Malta had been on the French mainland how long would they have held it? If Malta had been to France what Gibraltar is to Spain the French would have held it for ever. We could never have regained it simply by regaining the command of the sea. I may say, in conclusion, that the question which strikes me as being one of common sense simply amounts to this. You say we want the command of the sea. We all admit that the British Navy is our first line of defence, and it must be made as efficient as possible. What does the command of the sea mean? Is it possible that anybody can stand up here and say that he believes that a fleet can be made so strong that it shall at all times, in every sea, off every port, on every trade route, be invariably superior to all possible attack? If it be, Admiral Colomb's case is proved; but I say common sense answers "No;" and I say that my contention is proved by the fact that now, in time of profound peace, we are in a condition in which we are admitted—not by general opinion, but by the opinion of experts, of people who know, to be behindhand—to be so much behindhand with our Fleet, that it needs a sum, variously estimated, from 12,000,000*l.* to 100,000,000*l.* to put the Fleet on an equality with what? With the Fleets of any two Powers—supposing that we have two Powers combined against us?¹

Colonel FRASER, C.M.G., R.E.: There is one point on which all seem to be agreed as fully as we are all agreed on the importance of strengthening the Navy, namely, on the patriotism that has animated the lecturer in bringing forward the subject. At

¹ Since the lecture the Fleet has been declared *officially* to require an expenditure of 12,400,000*l.*, beyond the ordinary expenditure in the next four years, to bring it up to its proper relative strength; and does even this satisfy naval Officers? Where then is Admiral Colomb's perfect Fleet?

this stage there is less to be said, because naval speakers have expressed dissent from what, if an old friend will permit me to say so, are the more startling eccentricities to which he has given way. I will not, therefore, touch on more than one or two points. First, as to the origin of the defence of naval ports. Admiral Colomb seems to think that we adopted the practice from want of thought and have stuck to it through obstinacy. That line of argument would, I think, be equally applicable to the creation of the British Navy: we borrowed the ark from Noah; and since then we have borrowed ironclads from the "Merrimaes" and the "Miantinomas" and other monsters:¹ and we all go on building ironclads of new types, knowing full well that they are destined to be obsolete. We do this, not to cover our past follies, but because we do not know what on earth to do better to anticipate the future. I confess I think the simpler solution of both these questions is that defended ports and ironclads are the outcome of our necessities and, in the development of species, they mark this "survival of the fittest." The lecturer has based his arguments on naval history. There are few things history will not prove or disprove, and I should like to touch on one example he quotes, all the more pertinent because it is one that has happened in recent times and with ironclad fleets. He points out that in the war of 1870-71 an Admiral on one side, with all the freedom of an undefended base, and with an enormous naval preponderance of force, was prevented from bombarding a town on account of the presence, I should have said absence, of a very inferior hostile fleet, 700 miles away. Now, if a General on land were under similar circumstances, similarly deterred, we should, I think, say that General was "unfortunate." I am quite prepared to admit that there may have been naval reasons for the Admiral's inaction that a landsman cannot fathom. But if there are, then I venture to say the teaching of history in this case is this, that the best way of strengthening the British Navy would be so to reduce its strength as to secure to it that preponderating influence over all superior forces that, judging from this example of history, an inferior force seems to possess: I say to reduce its strength; because if an inferior force can always restrain a superior force from taking action, then you will best strengthen the British Navy by so reducing it that it will always exercise the restraining power over its superior enemies that this fleet of Germany is said to have exercised over the French. In fact, according to this example, a small fleet of ships at the Hebrides will protect Great Britain and Ireland. I only mention this as an example of the teaching of history. I think you fancy I am not an interpreter of history. I agree with you in this instance at all events. Rather than accept such a conclusion it would, I think, be a race between you and me and the lecturer to throw this particular Admiral to the whales and to send history to Saturn, a place where I am told a dépôt has lately been started for conclusions which have ceased to agree with our own. Some people have been trying, I will not venture to say to frighten the Admiral, because in his case that would be impossible, but they seem to have made him "very uneasy in his mind, with gruesome pictures of vast fortifications round London, of a vast line of fortresses round these again, and so on to the coast, the whole defended by vast armies of the Continental type; and, worst of all, of a simple-minded Chancellor of the Exchequer led into wrong paths when he ought to be following what, we agree with the lecturer, is the better way." Now most of us know a bogey when we see it except, apparently, the lecturer, and I venture to say this is a very pronounced bogey indeed. It reminds one of certain figures one sees at fairs, that are put up for the express purpose of being knocked down again. The inventors of this bogey have drawn on their imaginations for their facts. Those who govern this country have all the facts before them. I only wish to goodness the public were as cognizant of these facts as the Government must be. If they were, I think the interest in the strengthening of the Navy would exceed all other interests at present. No doubt the Government, with every means of judging the

¹ Defence on land and sea has alike undergone great changes since 1862, but the fortifications of Portsmouth and Plymouth are at least as efficient for the defence of those places from attack as are ships of the "Warrior" class to take a place in the line of battle.

merits of the question, and with a weight of responsibility which we have not, will best decide what measures are to be taken on land, and what is to be done at sea. If I may venture to make one broad criticism on this admirable lecture, in which, if there is a good deal of quartz, there is not a little gold, it is this: you do not improve the case of the self-evident and the unanswerable by piling up arguments which, on the authority of naval speakers, appear to be not only answerable but in their opinion untenable. And to the bogey-mongers I should like to say, you do not heighten the effect of a picture by throwing dust in the eyes of those whom you wish to admire it, and to be influenced by it. I next come to the remarks made by a most genial speaker and already noticed by others. Captain Fitzgerald has settled a little side issue, namely, that connected with land defence. He has pronounced authoritatively, *ex cathedra*, that we are "not in it." Well, it would be uncourteous to say that there is a difference between assertion and argument, but let us see what he asserts. We do not want to set up a bogey, but to state as fairly as we know how the contention that he and others have put forward as unanswerable. It is, I think, contended, first, that invasion is absolutely impossible unless and until our power at sea is completely and once for all destroyed past all recall; second, that no one will take the trouble to invade us because they can starve us out. We all agree that when the Navy is put in the supreme position in which we desire to see it, then we may hope the seas will be as safe as in peace-time, and the idea of invasion will be absent from our minds; that in the meantime if our Navy be gone completely and past recall our Empire will have gone with it; in which case there will be little left to live for, not to say to fight for. And it would only remain for the "unfittest" half of our population to set to work and die off at once. I am not a panic-monger, but, while I think the contingency of invasion to be remote, it does seem conceivable in a state of things considerably removed from such a dreadful cataclysm as the entire annihilation of the British Navy.

Captain FITZGERALD: No.

Colonel FRASER: That is a very fair difference of opinion. We have been told that in these questions the appeal is to history: to history let us go. At the beginning of this century we were supposed to be supreme against the fleets of the world. We had fewer rivals to oppose us; less territory and fewer seas to hold than now; no coal to think about, and relatively to our strength a larger number of ships to be "everywhere." At that time naval affairs entered much more into the life of the people in this country than they do at present. The population of these islands was about half what it is now, and yet the people of England thought it necessary to maintain a total of something like a million of fighting men. If in the opinion of our forefathers at that time invasion was possible, are we wise in coming absolutely to the conclusion that it is entirely impossible now? As regards the military possibility of the operation, the greatest master of war the world has ever seen thought it feasible; and the General who defeated him has recorded his agreement in that opinion. What were the conditions in 1805? Armies were slowly organized, more slowly concentrated by road. The northern coast of France was not then provided as now with great artificial harbours. The floats that it was intended to use were little better than those in which Cæsar and the Tenth Legion successfully made the passage: and the difficulties owing to their being dependent upon wind or oars were very considerable. What is the state of the case now? The north of France is provided with vast and commodious harbours, the last of which was opened, I think, only two or three days ago, and in those harbours there are always great numbers of steamers that can, as the lecturer has pointed out, move with a certainty that was unknown before steam, and can cross in a few hours, while we all know the rapidity of modern mobilization. Lastly, the lecturer has given it as his opinion that Napoleon's failure was due to Villeneuve's want of nerve. It may be so, and that if the great leader could have inspired that broken reed, as he inspired his soldiery, the attempt might have been made; but there is one lesson that we cannot, I think, draw from history: it is that what the incapable have failed to perform in the past the capable will alike fail to perform in the future. If we disband, as Captain Fitzgerald suggests, I think we increase at once the temptations to invasion, and invasion itself will be possible with largely reduced numbers, while we should be incapable of those offensive returns by which our

Empire was won, and by which alone we can close with an enemy we cannot starve.

Captain FITZGERALD : I never suggested disbanding.

Colonel FRASER : In the event of certain contingencies, I would ask how do we stand at this moment? Are you prepared, or are you not, at once to safeguard Britain, to secure the Greater Britain, and to hold our trade roads everywhere at sea? If you are, why do you, as we think rightly, ask for an augmentation of the Navy? If you are not, what are you going to do for some years to come? Are you going to palisade England with a floating boom of ships and leave our commerce to our enemies? In such case, while you save us from them we stand to lose the Empire by which we live. I do not presume to say how you will do the best you can to safeguard us everywhere; but you will doubtless try. Meantime this is not, I think, the moment for putting aside the terrestrial string to our bow; nor until we get a bigger basket should we put all our eggs into one. While we put our faith in the British Navy I think we ought to keep our powder dry on shore. Finally, is it so certain that nobody will take the trouble to invade us because they can starve us out? There is a wide difference between the starvation that would follow your annihilation, and the ups and downs of a protracted war, in which our commerce may often be interrupted as it has been before. This country, where economic laws now impede cultivation, can, at need, feed a larger population than in 1805. Unless all our ports are effectively blockaded neutral ships can come in. While the success of blockade running, even if for a moment we come to that, points to the influx of much food at the worst. The starvation bogey has, I think, been exaggerated. In the autumn we have six months' supply in this country to carry us through the winter. It has been suggested we should have bread, but our people could not buy it. In such case, not to take higher ground, it would be cheaper for us to put the Poor Law machinery into motion rather than to pay five times five milliards and hand over our Empire, including the British Navy. If Nelson has a successor he will lead you sometimes to Copenhagen—to Aboukir—to Trafalgar. Doubtless you will have ships in narrow seas as well; and we would expect you to beat your enemy as of old; but none of us, not even the most inexperienced, can predict with certainty the result of every naval fight; because none of us know which ships and what methods will prevail. We have to think of the stakes that other people will be playing at. Each side will strike with its strongest arm. We cannot crush, say France, on land, on account of her immense armies, nor can we starve her out. On the other hand, the capture of London would terminate an otherwise interminable war, would transfer our Empire to our enemies; and last, but not least, among the moral factors that control the acts of men, such a dramatic success might be attempted as the only means of perpetuating the dynasty of a dictator.

Admiral the Right Hon. Sir J. C. D. HAY, Bart., C.B. : I have learned so very much from my friend Admiral Colomb on former occasions that perhaps he will forgive me if I cannot on this occasion thank him so much for his paper, at least for the information it contains, as I would have expected if I had not heard the paper. The advantage of the paper has been the discussion which it has elicited, and, I believe, that was the object he had in view. My gallant friend began his paper with a historical fallacy, because he speaks as if an invasion was something which could not possibly be anticipated. I would only say that the shades of William the Conqueror, or Henry Tudor, or Dutch William would contradict that assertion. I believe that this country has frequently been successfully invaded, and that it might be invaded again. I am one of those who think that it is open to invasion and that such a thing is possible—I hope it is not probable. I may say that when I seconded Sir Frederick Smith's motion in the House of Commons against the expenditure of 14,000,000*l.* on fortifications, which I think was a very considerable sum, whatever Major Walker may say, I did so, not on the ground that I did not think it desirable that Portsmouth or Plymouth should be fortified, although at that time I did profess that the forts would not probably be completed or armed for a very long time, and I believe I was tolerably accurate in that supposition, but it was because I thought that Filey or the Black River in Essex, or Pevensey Bay, could not be defended by the forts at Portsmouth, and that a great fleet is necessary for the protection of our shores and for the prevention of invasion. I understand Admiral

Colomb's paper to mean this. If the amount of money to be spent is limited, first of all complete your fleet. I go with him as far as that. But to say that fortifications are useless is against that ancient history which my gallant friend referred to, but as to which he, in the meaning in which he uses it, is in my opinion wrong. When Lord Nelson or Lord St. Vincent blockaded Cadiz, why did they not destroy the Franco-Spanish fleet? Because Cadiz was fortified. Why did Lord Hood take possession of Toulon—though an ignorant Secretary for War and First Lord of the Admiralty who were civilians did not support him when he had possession of it—why did he make that the base of his operations for a considerable time? Because he had got at the French fleet, and because the fortifications of Toulon were not at that time manned to oppose him. As soon as they were manned to oppose him he was turned out of Toulon and lost his base of operations. I agree with the last speaker that what we want is a strong Navy, and I disagree with him in thinking that you cannot get a sufficiently strong Navy for the purpose. I think he stated that at the beginning of the century we had conceived it necessary to have a sufficient fleet. We had, on the average, 146 sail of the line always at sea, or ready for sea, in addition to a number of others which were not available. And when we were not superior to the whole of Europe we took possession of the Danish fleet in 1807, and then made ourselves superior to the whole of Europe, and a very good thing too, I think, and I am glad it was done. It made us superior for the rest of the war, and if we had done it earlier in the war, if we had kept Toulon and had seized all the fleets that might have been opposed to us, as we did the Russian fleet in the Tagus and the Danish fleet, we should have had the command of the sea as we had from 1807 until about 1840. I am not entirely hopeless that the country might rise to a great spirit of indignation, and may say that for every battle-ship which is opposed to us we shall have one here—that we shall have ship for ship against everything that could possibly be brought against us. The gallant Officer who preceded me seems to think that their days are numbered; in the meantime other people have got them, and we must have them also whatever they cost. I agree that until our fleet is made sufficient for that purpose we had better not spend money largely upon new fortifications. Those that we have ought to be armed. Those coaling stations which have been recommended to be fortified should be fortified against raiders and cruisers, and the sooner the better. I trust that when my honourable and gallant friend the lecturer stands up to reply he will put on a penitential sheet, or will, at least, tell the meeting that he has been humbugging them.

General Sir J. LINTORN A. SIMMONS, G.C.B., G.C.M.G.: The paper which has been read to the meeting by Admiral Colomb is one of very great interest, but I think he has gone a step beyond what his conscience would dictate to him as the proper thing. He has done it, I have no doubt with the best of intentions, to elicit discussion. But the question as it stands at present is one which is rather of an academical than of a practical character. My reason for saying so is this. If the fleets of Great Britain are sufficient to maintain absolute supremacy on the seas in all parts of the world, so that it would be impossible for hostile ships to come near us and annoy our ports, and levy contributions from our towns, and destroy our coaling stations and commerce, then I say we want very little more. The Army would in that case have to defend our land frontiers in India, Africa, and America, depending upon the Navy for the safety of their communications, and would not be necessary for the defence of these islands. But I should like to ask, Is the fleet in that condition? (No.) You all say no; and I believe myself it is in a very unsatisfactory condition for the performance of that great function. Having lived in a naval port for some years, I have observed that the Commanders of ships of war, even in peace-time, when they are not compelled to keep the sea in all sorts of weather, and have not an enemy to meet, are very glad on coming into port to find a dock in which their ships can be refitted and repaired before going to sea again. The wear and tear of ships of the present day is very great. That is the experience that I have gained from living in a naval port for four years; ships of the present day require constant attention and of such a nature that the repairs cannot be done by the ships' companies themselves, but must have the machinery for effecting them. That being the case, coaling stations are not only of use for coaling purposes but they are re-

fitting stations, of the greatest importance to the Navy. Setting aside the question of coal, if a hostile cruiser could get into a port in which you have the means of repairing ships, and could destroy those means, it would seriously affect the efficiency of the Navy. For instance, let us consider the Mediterranean. A ship that wants repairs in the Mediterranean has only one port it can go to for them, namely, Malta. If Malta does not exist as a repairing port, where is the nearest port? It is in Great Britain, in the United Kingdom. Can you afford to be sending your ships home all that distance to get those repairs which are necessary? If you are compelled to send your ships these long distances to be repaired, you will require many more ships to keep up a blockade or to observe an enemy's ports. Now, with regard to the sufficiency of the Navy for the purposes which I have indicated, and for which it ought to be maintained, we have the strongest evidence as to what is necessary. A Report has been published within the last few days, signed by Admirals Sir William Dowell, Sir Vesey Hamilton, and Sir Frederick Richards. What is it that these Admirals, not discussing in this theatre, but having a due sense of responsibility, having studied the subject closely, and seen a great deal of evidence—what is it that they report? And remember that the Blue-books contain only extracts from their Report; there are probably many things in the Report itself which cannot be published to the world. It is very difficult to discuss these questions fully in public, because there is a vast deal of information which cannot be placed before the world. I say this advisedly, having been a member of the Commission of which Lord Carnarvon was President. We were for a long time occupied in taking evidence, some of which was given to us under a strict bond of secrecy, which is possibly the reason why that Report has not been published.

Sir J. C. R. COLOMB: I quoted from the published Report which appears in the Appendix of the Colonial Council.

Sir LINTORN SIMMONS: But I believe the whole of the Report has not been published. I was not aware until Lord Carnarvon alluded to the passage in that Report respecting the Navy that any part of it had been published; certainly the evidence on which it was based has not been published, and I suspect that similarly a great deal that was before these Admirals could not properly be published. It would be as unwise to publish the facts upon which the defence of this great Empire depends as it would be for the Germans to publish all the schemes of attack and defence across their frontier upon which their great system of defence has been determined. I will go back to the recommendations of the Admirals. They say: "It is not necessary to point out the incalculable mischief that so enterprising an enemy might inflict in even that short time (that is about thirty hours), and how imperative it is to complete the military defence of our great commercial centres without further delay." Towards the end of their Report they say: "It would be far more in consonance with the requirements of the nation by the provision of an ample fleet to render invasion an impossibility, than to enter into costly arrangements to meet the enemy on our shores, but under the conditions in which it would be possible for a great Power to successfully invade England nothing would avail her, as the command of the sea being lost, it would not require the landing of a single man upon our shores to bring her to an ignominious capitulation, for by her Navy she must stand or fall." Now, I believe myself that the Navy is the first and most important line of defence. We can do nothing without it; everyone in this country must be of that opinion. But I do not quite subscribe to the opinion that because the Navy might have been worsted for a time in any particular sea the country is to be invaded or reduced to subjection by starvation. I believe that our Navy will be distributed in various parts of the world. It will not be all in one great fleet, and one great battle will not decide which is to be the prevailing Power at sea. Supposing a fleet blockading Brest or Cherbourg, or any other port, were worsted, and it is quite possible that it might be worsted, because it would be fighting under unfavourable conditions in comparison with the enemy, whose ships being in port would be free from wear and tear and not liable to loss, whereas the blockading fleet would be subject to the raging of the elements and to accidents, and would be kept continually at hard work with a large amount of wear and tear going on—supposing under those circumstances that this fleet were worsted, it does not follow that all the other fleets of Great Britain in other seas should be worsted likewise; and it does not follow if there are naval

ports secured by fortifications, for the time that those fleets could not find their way into them and that they could not be brought together and reinforced; so that there is no reason why we should not resume the supremacy, that is to say, provided that we have a sufficient number of ships. But, in the meantime, while this assembling of the fleet was going on we certainly might be exposed for a time to great danger on the shores of England. This danger may be of various sorts. If it were intended to subjugate the country, a force of from 150,000 to 200,000 men, or perhaps more, might be required; but what should be said of an invasion with 10,000 men, accompanied by such measures as those which would have accompanied the invasion had it taken place in the time of the First Napoleon? I looked up, the other day, what Napoleon himself stated with reference to this question. He said: "The *canaille* of all nations are nearly alike, I would have made such promises as would have had a great effect—the proclamation that we came as friends to relieve the English from an obnoxious and despotic aristocracy, together with the proclaiming of a republic; the abolition of the monarchical form of government and the nobility; the declaration of the forfeiture of the land of such of the latter as should resist, and its division amongst the partizans of the revolution; and a general equalization of the property, would have gained the support of the *canaille*, and of all the idle, profligate, and disaffected in the Kingdom." If 10,000 men were disembarked on the coast of England, their numbers might be magnified tenfold. I do not mean to say they would bring about a revolution, but if revolutionary documents such as Napoleon designed were scattered broadcast throughout the country, and all sorts of promises made, I think some of the gentlemen who frequent Trafalgar Square would only be too delighted to throw in their lot with the invader. The whole of these questions depend on the possibility of the Navy doing the work which the gallant Admirals describe as their duty. The Admirals in their Report said: "That the Channel Fleet (so called) should, supposing the enemy to be a great maritime Power, be of sufficient force to blockade the fleets of such Powers in their ports or to bring them to immediate action should they put to sea." That is the first requisite, but what does it imply? It is just as necessary, I presume, to blockade (speaking subject to correction in the presence of so many Admirals) not only the fleets in the home ports of the Powers with which we may be at war, but their fleets also that may be in the China Seas, in the Mediterranean, or on the coast of Africa, or anywhere else. This involves a very large force, and then there is another thing: history tells us the enemy's fleets have not always remained in their own ports, and it is possible for a large fleet to be detached before the commencement of war to a neutral port, in which case they could not be blockaded, because by doing so you would bring upon you the hostility of the Power to whom the port belongs. (No.) If you attempt to blockade a ship in a neutral port you are liable to bring upon you the hostility of the neutral Power. (No.) Whether that be so or not this Channel Fleet will have to be of immense dimensions; the Admirals state in the proportions of five to three of battle-ships alone to blockade the enemy's fleets, which I take to be the object wherever they may be. Therefore it would be a fleet, the duties of which will extend beyond the Channel, even to the Chinese Seas. That is the first batch of vessels required, namely, the so-called Channel Fleet. The Admirals then go on to say: "There should always be an effective Reserve Squadron, absolutely confined to home waters, sufficient to hold the Channel and protect the coasts and commerce of the United Kingdom." That is a rather large order; it evidently points to the possibility of the blockading squadrons not having been successful, and that hostile fleets may be on your coast, otherwise this Reserve Squadron would be of no more value than it is contended the fortifications for the defence of harbours are, because, in fact, if your blockade be perfect, the enemy can never come near the coast to bring this Reserve Squadron into action. Then comes a third lot: "in addition to the district coast defence ships which would be necessary for active local defence on the coast of Great Britain, Ireland, and the Channel Islands." The above constitute three requirements. The fourth is: "that there should then remain available a sufficiency of battle-ships and swift cruizers to reinforce our squadrons abroad to the necessary point of superiority with reference to the requirements of each station, for the formation of detached squadrons and convoys for commerce and troops over and above the number required for home and

Mediterranean service." That again is a pretty large order. And, fifthly, "an ample reserve to meet the waste of war." Now I do not mean to say any one of these five requirements is not necessary, but this I do say, that I believe, subject to correction, that your fleet at the present moment scarcely fulfils the first of these conditions, and before you get these five requirements complete, years must pass and a vast expenditure must be incurred. The Navy has been let down to that low point that it would require a long time to bring it up to the strength considered necessary by these three Admirals, men of great experience, who having before them the reports and opinions of other Admirals have, under the weight of responsibility cast upon them, stated their opinions to the country; it is of importance that this should be borne in mind; at the same time, and certainly for the years that must elapse before the fleet can be brought up to this strength, I cannot subscribe to the theory that fortified coaling stations and defences for large mercantile ports are not necessary. The lecturer has made allusion to Gibraltar. What are the facts? It is quite true that the Army alone cannot hold it for any great length of time without support. We, the Navy and Army, must work together. The communication with Gibraltar can only be secured and its revictualling carried out by the Navy, but in the absence of the Navy the Army can hold it as long as the provisions for its garrison last. What was the use of Gibraltar on one memorable occasion? After the Battle of Trafalgar Admiral Collingwood took his fleet in there: he was very glad to find a port near at hand where he could refit and repair. The converse happened with Admiral Dumanoir, who made his escape after the battle with four or five line-of-battle-ships, and was met by Sir Robert Strahan on his way to his port 600 or 700 miles distant. If he had had a port under his lee, or within 200 miles, he would have got into it in safety and so preserved his ships. What happened as regards Malta? It entered into Napoleon's designs to get possession of it. He went there, and in the course of two or three days the garrison got frightened, or rather there was treachery in it, and they surrendered; but if there had been a British garrison there no doubt Malta would not have surrendered, and it would have been secured to Nelson during his operations against the French Admiral. These are points which have to be borne in mind. Then, again, reference has been repeatedly made to Singapore. I think the necessity for the defence of Singapore by fortification is evident, it being very distant, in a position in which trade concentrates, where there is necessarily for commerce a very large accumulation of coal. I know at one time there were 140,000 tons of coal collected there merely for commercial purposes; well, a large depôt like that is of great use to the Navy as well as to the commercial marine. If there were some moderate defence there to keep off such a squadron as is likely to attack it, Her Majesty's ships having coaled there and gone to meet their enemy, might feel assured that on their return they would find not only coal but machinery to repair their engines and assist them in putting their ships into a proper state of efficiency. I think these are grave considerations, and I may say this with respect to Lord Carnarvon's Commission, that it endeavoured, under the deep sense of responsibility which rested upon them, to minimize the defence of coaling and refitting stations to the utmost. We had to consider, in the case of every port which was proposed to be defended, the nature of the attack to which it would be exposed, and the means available in the place for the assistance of the troops. That was done most amply in the case of all those ports, and I believe the defence of each was minimized to the utmost. It is not a question of millions of money, and diverting these large sums, as has been stated, from the Navy. The amounts proposed to be expended were not so very large, and I believe that the expenditure that was recommended is absolutely necessary, not only for the ships of the Navy, but still more if possible for the commercial marine. I do not know that I have much more to say on this subject. I think perhaps you may consider I am riding my hobby-horse to death in saying it, but it appears to me that the whole of this discussion points to one thing: we in the Army and you in the Navy are two separate departments working for one purpose, that purpose being the defence of the Empire. We are all deeply interested in it. I should be very sorry to say one word, or see anything done by military men which would derogate from the efficiency of the Navy, or retard its being made much stronger than it is. But my experience in years past has been that there is a pulling and hauling on the part of the two Services to get

as much as they can out of the Chancellor of the Exchequer. We see the defects of our Service, naval men see the defects of theirs, and we each try to get as much as we can, and it is our duty to do so, to make our respective Services as efficient as possible; but I do not think that there is that combination of the two Services for the one great object that there ought to be, and I believe the true method, by which alone the measures that should be taken for the defence of the Empire as a whole can be properly settled is that there should be a Minister for Defence, for War if you like to call him so, and that the two Departments shall be subordinated to him; one Cabinet Minister and two others, not necessarily Cabinet Ministers, subordinate to him, each responsible to the country for the efficiency of their respective Services. I have been attacked as to my ideas being Utopian, but I am happy to see that a good many provincial papers have taken up my views. My idea is this, that the question ought not to be a political question; and that there should be a few good men, whether you call them Commissioners or whatever you may choose to call them, under a Cabinet Minister, who will consider such questions and work them out as a whole. If Imperial defence had been properly worked out as a whole, this discussion would not have taken place, because the question raised by the lecturer would have been under the sense of responsibility attaching to each individual who had assisted in working it out. Then I go a step further, and say that the Minister under whom such a project had been elaborated ought in some way to assist in seeing that his project is carried properly into effect. A question was asked by Sir John Adye in a letter to the "Times," whether it was reasonable to place an ex-Minister as an assistant to a Minister in office. I can only say from my heart that I believe it is unreasonable to suppose that the public men of England have not sufficient patriotism in them to work upon a non-political question, involving such vital interests to the Empire, in perfect harmony. All that I can say is, having served on Lord Carnarvon's Commission where there were men of divergent politics representing different political parties, that we worked in perfect harmony and brought our Report to an unanimous conclusion.

General SHUTE, C.B.: As I am Vice-Chairman of the Brighton Branch of the Naval Volunteer Defence Association, and having taken a considerable interest in this subject, I am extremely glad to have heard the very able lecture of my gallant friend, in most of which I fully concur, though I feel that he somewhat rode his hobby to death. The Army and the Navy, since the days of our being so closely associated in the Crimean War and up to the present time, have become more than sisters. We are twin sisters, and most affectionate sisters. Now, as regards what the gallant Admiral has advanced, I also am perfectly satisfied that the defensive wars of this country will, and indeed *must*, be fought on sea and not on land. I am perfectly satisfied, however, that the Army and the Navy must work hand-in-hand if England is to remain a first-class Power. The fact is, I am satisfied that this country will never be invaded. It ceases yearly more and more to be self-supporting, and thus partial investment seems more and more its chief danger. Now I do not for a moment deny that it is perfectly possible to invade England. I know of 50 miles on our south coast where I could select three or four places where with perfect certainty you might throw 200,000 men on our shores, either as one army or by army corps, at spots sufficiently contiguous to be able to give immediate support to each other as one army, covered of course by an inshore squadron, or squadrons carrying heavy and long-range guns, and provided the weather was moderately fair. But the conditions necessary to such invasion would render invasion an absurdity. Why should an enemy invade England? The conditions necessary would be similar to those that occurred in regard to our invasion of the Crimea, viz., that our enemy must have as complete a command of the British Channel as England and France had of the Black Sea when they landed at Old Fort. And what would that imply? It would imply that our Navy was utterly shattered, that our commerce had been destroyed, that our food routes were cut. It being so, why should any country invade us? In these democratic days, with semi-starvation you would have a Commune in London and revolution throughout the country. Your army of defence would be threatened by the enemy in its front and rebellion in its rear. Our country bankrupt, our population starving, we should be at the mercy of our foes. Why, then, should they waste men and money on

invasion? If we are starved we must go down upon our knees, and no doubt our enemy would be able to demand any terms that he thought proper, including the giving up of the remainder of our fleet and an enormous indemnity, with Dover and the Thames and Medway as a material guarantee, and if the Channel Tunnel be completed, then with a perfect communication with the Continent. But as regards the gallant Admiral's able lecture, I must make this strong observation in opposition to what he has said. The Navy must be thoroughly and efficiently coal-fed from shore-protected depôts in every part of the world, giving our ships thorough freedom of action; our military ports and large commercial ports must have permanent and good defence. With regard to ingress and egress from those ports, I admit that that must be entirely dependent upon the Navy. We should have battle-ships equal to any combination that is likely ever to occur, and cruisers, not according to the number of cruisers that other nations have, but cruisers in proportion to the vast quantity of merchant shipping, on the defence of which our very existence as a nation depends. Then, gentlemen, though a soldier, I say leave the Army for the present as it is, and use your energy to make our Navy as strong and efficient as possible.

Lieutenant-General Sir JOHN STOKES: It is a great presumption on my part to rise to address this audience, but there is one point which I do not think has been quite brought out. I think we are all agreed that the Navy ought to be our first line, and as strong as it can be made, and that in order to bring it up to that point it will require a great many years' work. Admiral Colomb in his paper deprecates spending money on fortifications which might be better employed in increasing the strength of your Navy. But those fortifications which are asked for, for the defence of our coaling stations and our commercial ports, would not involve a very great expenditure, even if spread over a comparatively short time. Many years must elapse, as I say, before our Navy can be placed in the state which it should occupy in order to maintain the command of the sea, and until that object be attained you want your fortifications in order to defend your depôts on shore, and, therefore, as an interim measure, I say let us have the fortifications. In this discussion, comparing present times with past times, I think it may have been said before, and better perhaps than I can say it, that in former wars our fleets and cruisers were self-contained. They could go to sea and remain months at sea, and could hold their own until they were absolutely driven back by being dismasted by storms or during action. In these days you cannot keep the sea; you must go back for coal, and you must go back to refit. I think that point, combined with the other, shows that we ought to have protected stations, in which our ships can find what they want.

Sir LINTORN SIMMONS: I omitted one point of very great importance, and, therefore, with your permission, will add a few words to what I have said. In 1803, at the conclusion of the Peace of Amiens, our total naval and military expenditure was 23,590,757*l.* In 1814, as the result of the war, our naval and military expenditure got up to 71,686,707*l.*, and we paid loans or subsidies to foreign States to the extent of 8,442,578*l.*, making a total of 80 millions for the war expenditure for the year, being the expense we had to submit to in order to maintain our position. Last year our total military and naval expenditure was 30,785,687*l.*, being an increase of only 30½ per cent. upon what it was in 1803, while the population had increased from about 16 millions to 37 millions, or 131 per cent. The charge per head of the population for warlike expenditure in 1803 was 29*s.* 5½*d.*, as compared with 16*s.* 7½*d.* in 1888, or 44 per cent. less, so that we are very much less taxed now for military and warlike purposes than we were in the early part of the century. The imports and exports in 1803 were 62¼ millions, and in 1888 the imports and exports amounted probably to not less than 850 millions, carried in ships, the value of which was close upon 150 millions, representing, therefore, 1,000 millions as the value of British property traversing the sea annually at the present time, of which an average of about 150 millions is afloat every day in the year, being the value of British property upon which an enemy would have to commence operations. These amounts do not include coasting trade. If a penny on the pound were levied on the 1,000 millions of British property traversing the sea annually, it would amount to 4 millions of pounds. Sixpence on the pound would go a long way to give the country all that is required, or a penny on the pound for six years; and it

is worthy of consideration whether, as long as our policy is of a peaceful nature, any Power would seek a quarrel with us if we are true to ourselves and are so prepared during peace as to give us under Providence a reasonable certainty of success. The fact should be well pondered by every Englishman that the warlike expenditure in 1814 was about 4*l.* per head, and that by raising it to 1*l.* a head for a few years during peace it is not improbable that we might escape war altogether and continue in peace, without the prospect of having an overwhelming war expenditure forced upon us.

General Sir R. HUME : At this stage of the discussion there is very little left for any of us to say that has not been said already, either in favour of or in opposition to the lecturer's opinions, but I think, at the same time, for one or two minutes we are justified in getting up to express our concurrence or disagreement with the views that the lecturer has so ably laid before us. If I had spoken earlier I had many very brilliant ideas which I should have laid before the meeting, but so many other Officers have anticipated me that I should not be justified in taking up your time in repeating those ideas. I would merely remark that almost the first point of Admiral Colomb's lecture is the dispersal of the Army all over the world, and he goes on to say, "I will endeavour to show cause against this." As long as our Empire is constituted as it is at present, and I hope it always will be, with large detached foreign possessions and Colonies, it is impossible that we can maintain the Empire unless our Army is largely dispersed all over the world, and I myself cannot conceive a Navy so strong or so ubiquitous as to enable us to dispense with some defences for our garrisons and for the inhabitants of those places that we occupy on the sea coast at a distance from England. On that account I would say that, granted of course the first broad contention that we must have command of the sea, I think that the Navy will be supported and assisted in maintaining that command by the local defence of the positions which we must occupy all over the world. The lecturer, in what has been to me a most interesting and most important lecture, says, towards the end of it, that the moving navy must be either in command of the sea or fighting for it. When the moving navy is entirely in command of the sea, our land fortifications and defences are of relatively minor value to what they will be when the Navy is fighting for it, but when our Navy is fighting for the command of the sea, I maintain that our land defences will be of very great importance. I simply stood up, Sir, to occupy a few minutes in saying that I concur entirely with the lecturer where he says that we must have the command of the sea, but I do not agree in many points, which I have not time to allude to, in the manner in which he considers our naval supremacy should be maintained.

Admiral Sir ERASMUS OMMANNEY, F.R.S. : The observation I wish to make is this, that, assuming I had command of the Channel Fleet in war-time, nothing would make me feel more happy than to know that the approaches to our naval ports and arsenals were defended impregnably, so that I could have free action to operate against the enemy in all parts of the Channel. With regard to the history quoted by the lecturer, I differ with him very much, because I think, so far as history goes, it shows that fleets have seldom succeeded in attacking fortresses. With regard to the advantage of fortifications, I would quote Malta, for instance. Defended as it was in former days, no ship could enter Valetta harbour exposed to the raking fire of Fort St. Angelo and the cross-fire from other batteries without being sunk ; therefore, this important island succumbed only after blockading. Much stress is laid on the relief of Gibraltar by the fleet of Lord Howe during the celebrated siege by the combined forces of France and Spain, but previous to the appearance of this fleet, the garrison of Gibraltar had nobly repulsed the formidable attack of our enemies on the Rock by land and sea. This impregnable fortress has proved a tower of strength to us as a naval depôt and a base of protection to our commerce with the Mediterranean and Morocco. I, therefore, think that our ports should be sufficiently fortified. I wish to point out that Admiral Colomb has made one oversight with regard to the operations of the French Fleet during the Franco-German War. The reason why the French Fleet remained inactive was owing to the seamen being sent to Paris, where they were employed in manning the detached forts when Paris was invested by the German Army. I merely point that out and will say no more at present, unless we should have to go over the ground

again. I think we are extremely obliged to Sir Lintorn Simmons for bringing forward that Report on the recent naval manœuvres so conspicuously before this meeting, and I think every naval Officer must endorse the opinion expressed by that Committee. I was very glad to hear Sir John Colomb point out the importance of the Island of Mauritius. I know it well, it is the Gibraltar of the Indian Ocean. I would emphasize as strongly as Admiral Colomb the importance of maintaining our supremacy at sea. I say, let us have two strings to our bow, let us have the forts as well as a formidable Navy, and when the emergency arises I hope that the Army and Navy will have "a pull, a strong pull, and a pull all together."

Lieutenant-Colonel FEATHERSTONHAUGH, R.E.: Captain Penrose Fitzgerald challenged the Army to answer this question. He said the "Times" had remarked that if the Navy is as it ought to be, no more is required. Well, Sir, I would just allude to what occurred at Berehaven. There we had one Admiral blockading another Admiral, and we must suppose the first Admiral was in command of the sea. What happened? The Admiral blockaded broke out. The place I was at was about thirty-six hours' steaming from Berehaven, and as soon as we heard he had broken out we calculated he might be with us at five o'clock on a certain morning. He arrived at seven o'clock, and if he had been a fast going mail steamer crossing the Atlantic he could not have performed a more rapid or more perfect voyage. These ships, Sir, that broke the blockade touched at every commercial port in the kingdom—Liverpool, Aberdeen, Leith, the Tyne, the Tees, and I do not know where else they did not go, and there was not anybody able to stop them. I mentioned that to a distinguished Officer the other day, and what did he say to me? He said, "We do not intend to defend the commercial ports." There is another cat has jumped out of the bag. The Navy may win a victory off the Downs, but in the meantime every port in the kingdom is to be smashed to pieces. Is this meeting to approve of that idea, and would the country like such a state of things?

Captain FITZGERALD: May I be allowed to repeat a short quotation I made at the last meeting, as there seems to be some misunderstanding about it: "If the Navy is made thoroughly competent for its work no other defence for these islands, or for the Empire at large, will ever be called into play: if the Navy fails us no other defence will avail to avert crushing disaster."

General HARDING STEWARD: It is now so late that I will not detain the meeting more than two minutes. I wish to speak about commercial harbours. But, before saying anything on that subject, I must say that I admire the way in which Admiral Colomb has attacked us Engineers. He has, I believe, done it with an object, and I think he has gained that object entirely: although he has *not* proved his case. I think, however, that he cares but little about that. During his lecture, about the end, I observed that he made one important admission. For, after decrying fortifications and saying they were *not necessary*, he admitted that the coaling stations ought to be secured by fixed defences from capture by a *coup de main*. That is, however, all that we Engineers want to do. He then went on to speak of commercial harbours and to say that they need not be defended by fixed defences. (Admiral Colomb here dissented by gesture.) The Admiral has unquestionably decried the use of fortifications for the greater ports, and I am sure that he altogether yielded their use for the smaller ports. At least I understood him so. But, whatever may be the drift of this lecture, I want to point out that Admiral Colomb has, on a previous occasion, written some very admirable notes and memoranda on the attack by cruisers of these same commercial ports, and he has proved to us that some local defences must be provided for them. We must, in fact, have what has been very properly called "the minimum of defence" both fixed and floating for these ports, and that, I think, is all that the War Office *desires* and, at any rate, all that the War Office *can* get from the country. Unless we have a small amount of fixed defences at our commercial harbours we may have our commercial fleets burnt at their anchorages. I really trust that what the gallant Admiral has said against fixed defences may not go the round of the Press, nor cause the public to object to, and the influential people in the commercial ports to come forward and decry the use of the moderate amount of fixed defences which we Engineers now desire to see provided for those ports.

Admiral Boys : We have listened to one of the most important lectures and one of the longest discussions that I recollect in this theatre. My remarks will be very short. Admiral Colomb prefaced his paper by asking members to "give it him hot," and I think to a certain extent he has had it pretty hot from some of the speakers. He refers to history to prove his case, but I think history is not altogether on his side. If instead of going back 300 years he had gone back as long as history records, he would find that there actually had been invasions and descents on the United Kingdom to the number of seventy, and forty-two since the commencement of the tenth century. It is our duty to prevent the possibility of number forty-three. We have had a good many opinions here from naval Officers on this side of the Channel on this matter of blockading the enemy's fleet ; I think naval Officers on the other side of the Channel have also an opinion, and I heard it stated lately that when the subject of our blockading their fleets in their harbours with our fleet, as it now exists, was mentioned, it was received with a doubtful smile. They think and they venture to state that with a very little help it is not impossible that they might be able to drive our ships into our harbours and blockade them there. That is not a position to be contemplated with any satisfaction. I must say I agree with Admiral Colomb, as many others do, in his endeavours and his advocacy to increase the fleet, and in such numbers as are considered requisite for the duties which it ought to do ; but if he proposes to leave our commercial harbours and our arsenals and our ports generally without any land defence whatever, I cannot agree with him.

Mr. R. N. PENROSE FITZGERALD, M.P. : Would Sir Lintorn Simmons, who has given us the most vital important statistics I have ever heard on this question, kindly, if possible, add to them the statistics of the value of the food supply imported by sea into this country in 1803, and the value of the food supply that is imported into this country in 1888 or 1889 ? I ask it purely for use possibly in another place, as it would be most valuable information.

Professor LAUGHTON : At this late hour I shall limit myself to very few remarks. I had meant to touch on the general subject of the lecture, but my opinion having been so fully expressed, more especially by Sir John Colomb, that there is scarcely room for me to say anything more, but on some of the historical allusions made by the lecturer and other gentlemen, a few words from me will, perhaps, not be altogether out of place. Admiral Boys said that this country has been invaded forty-two times ; and Sir John Hay pointed out that in past times the country was successfully invaded by William the Conqueror, by William III, and by Henry Tudor. This last can scarcely be counted as an invasion ; but in any case, there was no fleet to oppose it ; so also with regard to the instances referred to by Admiral Boys. But as to William the Conqueror's invasion, Sir John Hay has overlooked the fact it was delayed in Normandy for three months after the army was ready ; it was waiting—we are told—for a south-west wind ; a south-west wind in the Channel in July, August, and September ! The statement is absurd. It was waiting because the English had a powerful fleet at the Isle of Wight ; and until that fleet was broken up, the Duke of Normandy could not risk the passage ; when the fleet was no longer there, he crossed and effected the conquest. William III's landing can scarcely be spoken of as a foreign invasion : his fleet was commanded by an English Admiral, Herbert ; and the English fleet which was assembled at the Gunfleet to oppose him had been won over to his cause. No opposition was offered by it, and the Prince of Orange had reason to believe that none would be offered. I think Admiral Colomb's argument is a very strong one ; that with the Navy in command of the sea an enemy cannot undertake the operation of an invasion. It seemed to me in the course of the discussion that many of the speakers have not realized the power of a fleet in a flanking position, threatening to act on the rear, or to interrupt the operation of landing, on which Admiral Colomb has laid such stress. It is, as Admiral Colomb has pointed out, a matter of historical fact, a matter of common experience extending through all ages—not a matter of the last fifty years, but from the beginning of history—that no commander, if he is wise, will undertake a territorial attack as long as his operations may be interrupted by a fleet even considerably weaker than his own. Admiral Colomb mentioned two distinct cases in which a commander had violated this principle.

He might have gone further, there have been others. There was one as far back as 1217, when the French fleet, in great force, bringing reinforcements to the Dauphin in England, ignored a comparatively small force at Dover. What was the result? This small force fell on the rear of the French fleet, and annihilated it, off Sandwich, simply because it caught the French fleet in the most unfavourable position in which a fleet can be taken. Another instance occurred in 1759. The lapse of more than 500 years, and the enormous changes in the details of naval war, had made no difference in this fundamental principle of naval strategy. M. de Conflans, sailing from Brest, attempted to conduct the operation of taking on board an army, and that while such an enemy as Hawke was free to act on his rear. Hawke made a hawk-like swoop, and demolished him. These are two instances. I am not sure that the Battle of the Nile was not another. At any rate it is certain if by possibility Nelson had had with him the frigates that he ought to have had, if he had had one ounce less energy than he actually did have, the French fleet would have been caught in the ideal position that Admiral Colomb has pointed out, and have been made an example of to all ages. It was pretty well so as it was, but it might have been much more.

Captain FITZGERALD: Is not that an example of territorial attack when the attacking fleet had not command of the sea?

Professor LAUGHTON: The French fleet was destroyed.

Captain FITZGERALD: They conquered Egypt.

Professor LAUGHTON: The fleet was destroyed, the communications were cut, and the army was left in a mess from which not even the genius of Bonaparte could extricate it. There is just one more word I have to say. A good deal has been said about Gibraltar. It has been pointed out that the fortifications rendered its defence possible in the war of American Independence; that without the fortifications it could not have been held. It seems to me that it would have been a good thing for us if there had been no fortifications, if the enemy had been free to come and go. What possible good was Gibraltar to us for the four years the Spaniards were besieging it, from 1779 to 1783? Some 6,000 or 7,000 soldiers were shut up there, and the fleet was obliged at all risks to relieve them. What was the use of it? It was defending nothing; no property, no route; we had no interests in the Mediterranean, absolutely none, but because the strong fortress was there, and it would be dangerous in the hands of an enemy, we were obliged to retain it. For that we sacrificed our American Colonies. In 1781, when Darby was fitting out a large fleet to relieve Gibraltar, the blockade of which was maintained by the Spanish fleet, De Grasse was at Brest fitting out a powerful fleet for the West Indies. Darby would not interfere with De Grasse, for fear that if he made any attempt to do so, De Grasse would go south and join Cordova, and the two fleets, the French and Spanish combined, might prevent the relief of Gibraltar. He, therefore, drew back and waited at Cork till he understood De Grasse had sailed for the West Indies, and thence to the coast of North America. The action with Graves off the Chesapeake, the surrender of Cornwallis, and the loss of the American Colonies were the direct results.

Admiral COLOMB, in reply, said: Some of the speakers have pointed out that possibly my chief object in reading a paper, which certainly seems to have presented numerous anomalies to the audience, was raising a discussion. Now, with the help of our gallant Chairman, whose name was sufficient to bring the large audience together, we have had, I think, one of the very best discussions on any paper which has been read in this theatre. For my own part, the only fault I have to find with the discussion is that I have not been hit hard enough—perhaps I should not say hard enough, but close enough. That my friendly adversaries have not got out their daggers and their fists and come at me, but they have stood far away with their long lances, or with weapons of still greater range. What I mean is, we have been discussing a purely scientific paper, with the title "The Relations between Local Fortifications and a Moving Navy," and yet I am satisfied that when we come to read the discussion side by side with the paper hereafter, we shall see that we have said very very little indeed concerning those "relations." I must instance in saying that, and I do it of course with great diffidence, what Lord Carnarvon said, as showing that truly the points of the paper have seldom been grasped by the audience.

It has happened to me before this to read a paper here, to have it warmly denounced by a brother Officer, and to find that Officer saying to me after some little time, when I had asked him to re-read the paper, that he had re-read it, not once but twice, and that a veil had been removed from his mind, and that he saw the position I had put before him in an altogether new light. Now, when you have to put a great deal into an hour's paper, your words have to be so very accurate that they will not bear paraphrase. The moment you come to paraphrase you are nearly sure to go wrong. Most of the speakers have mentally paraphrased a great many of my sentences and misapprehended them. But, coming back to what I said about the instance of Lord Carnarvon showing how the real points of the paper have not been grasped, we must remind ourselves that Lord Carnarvon probably has thought of those things more than any of us here present. As the Chairman of the Royal Commission, he must have had the whole subject very much before him. What is the gist of my paper? I took as my texts certain theses which were put forward by a previous lecturer. What Lord Carnarvon has done, if you come to read his speech carefully you will see, is to reassert all those theses which I was discussing, but without considering it necessary to support his re-assertion by correcting a single one of my historical references or a single one of my illustrations. He said, towards the close of his speech, that the object of fortifications was first to free the Navy; *secondly*, to preserve ships so as to enable them to be repaired; *thirdly*, to supply coal to the ships; and *fourthly*, to deter the enemy's cruisers. Now these are exactly the four points that Captain Stone put forward, and those are exactly the four points that I used, historical and hypothetical illustrations, to combat, in order that we here, a naval and military audience, might get to the bottom of them and see whether it was actually so. Sir Lothian Nicholson flattered me in the strongest way when he said that this paper that I wrote would have a great influence on public opinion. Well, I do not deny that it may have a great influence on public opinion, but what Sir Lothian Nicholson said was that what would give it that influence would be the fact that it was read by an Officer like myself. Now I am quite certain of this, that any little influence I might have does not come in any way from me personally, it comes simply from the facts that I collect and put forward; and if it be the case that this paper is to have an effect upon public opinion, it will have it because I have endeavoured, even as an advocate, to put forward the truth. It is perfectly true that for the purpose of discussion I have put what appears to me to be the logical truth very distinctly, and as closely as I can, and also in such a way as to excite the opposition which I am happy to say has been excited. But I am sure of this, that the real discussion on this paper will take place hereafter. We have only started it now. We have to recollect this. And here again I must refer to what Sir Lothian Nicholson said. He pointed out that it would be an evil if my paper appeared in the press in anything like a complete state, and that the discussion in opposition to it, which he rightly judged would be in opposition to it, should appear in a garbled state. But all that has been said in opposition to me has been said year after year and month after month for 23, 24, or 25 years steadily. It is the first time, as far as I know, that the general view of the relative functions of fortifications and the Navy has ever been challenged. Why did it become to me so important to challenge it when I heard the opposite view distinctly stated by Captain Stone in this Institution? It is because, unless the Army and Navy come together in this way and discuss these points, where our functions are likely to overlap, and arrive at something like conclusions about them, we are doing what Sir Lintorn Simmons said we were doing, what I myself feel we are doing very often, that is, having a sort of game of pulley-hauley with the Chancellor of the Exchequer. But I am so satisfied with the cordial relations between the two Services as to believe that we want nothing to bring us together and to make us see our parts perfectly clearly but the continuation of the sort of discussion we have had here. Every one of us, I should think, must have had some new thoughts, some new suggestions, as to how far the Navy goes in these matters, and how far the Army goes; and what would happen to the Army if the fortification bills went up and the moving navy bills went down, and *vice versa*. If the Army were relieved from the pressure which now lies upon it—and it is a great pressure that providing heavy garrisons for heavy works—how could it be advan-

taged? If it were ascertained that the Navy could do the things which Colonel Maurice told us of, and that naval people all knew it? Colonel Maurice told us, and this is another reason why my paper was read—what is absolutely the fact, that the Navy steadily repudiates, and has for years repudiated, this defence question, and it has distinctly said: “We will not have anything to do with places like Singapore, or Aden, or Colombo, or the Cape: we will wash our hands clear of it. It is your business in the Army to do all this, our business is elsewhere.” Now that point in the naval mind is one of my principal objects of attack. I do not think that it is true: I do not think it possible that the Navy, whatever it may have done in former days, can shake from its shoulders this question of the defence of the ports. My gallant friend Colonel Steward, speaking of the commercial ports, said that I thought they could not be defended by fortifications, but I have never said that, and have never thought that of the ports themselves, only of the shipping frequenting the ports. If you examine my paper you will see that all through it I admit the plain patent fact that any port which you can close, any port that you do not care about keeping your communications open with, can be made secure with fortifications; and you can make it so secure that, like the hall-door of your house, it is the very last place that the burglar will think of going to. But the whole point of my paper is the difference between a port which you can close and a port which you must keep open. The point of it is that with regard to the coaling stations, these ports are, every one of them (I may except, perhaps, Bermuda), ports that the Navy must in some way keep open, because from them and to them flows the life-blood of the Empire. It has been constantly said by many speakers that I recommend the leaving of the ports defenceless: the idea of leaving the ports defenceless never crossed my mind. But I say that ports are defended—and that history shows it distinctly down to the other day—from heavy attacks by the threat of these attacks being interrupted from the sea, as was so excellently put by Professor Laughton; that the entry and exit to them must be protected by a naval force, a floating force, a moving force, and cannot be protected by anything that is fixed. As it is necessary for you to provide this moving force, it then becomes a question whether behind that moving force it is necessary to go to any very great expense in the matter of fixed fortifications, submarine mines, and what not. The mistaken point that most of the speakers have had in their minds is that where there were no fortifications there was nothing. But that has not been in my mind, and that has never been in my brother's mind, who, as far as I know, was the earliest of all to raise the question of the defence of the coaling stations. If you will read his first pamphlet on the “Defence of our Commerce,” published, I think, in 1867, you will note that he was always thinking of open ports kept open by naval force, and that he never had the slightest notion of heavy fortifications. He wanted a good garrison; he wanted special port defence vessels, and there in his diagram you have these port defence vessels, not defending the place itself, but the surroundings of the place, keeping the communications with it open, guarding the commerce where it was concentrated from the attacks which were most likely to be made upon it. And so you must recollect that when speaking of fortifications not being effective, I mean they are not effective for a port which must be kept open, because they will not keep a port open. I am sure that every military man will agree with me there; fortifications alone will not keep a port open. If you can afford to allow a port to be closed, all right, go on, spend what you like; but if it is a port you must keep open, we ought to go to work to keep that port open to provide the necessary force for keeping it open, and I think it stands to reason that if we keep the port open, we defend it. I cannot see that there is anything on the other side. If you provide a naval force sufficient to keep the port open, the enemy cannot touch that port. I am giving, of course, but a general reply. The time has gone on so long that I am sure those speakers who would like to be answered separately will excuse me from going closely into what they have said, and I think there is the less reason for me to do that because the paper will be found, if you study it closely (for I do myself the credit of saying that it is most carefully written), and go into it side by side with the criticisms that have been offered, there will be a great deal more agreement with me than there appears to be at the present moment. At the same time, I must admit, as I admitted at the

beginning, that for the purpose of raising discussion I have pushed the theoretical scientific question, I think, perhaps as far as I can push it. The practical outcome of it is a matter that I have not touched upon in the paper, but that is chiefly what has been discussed in this theatre, mistaking, I think, the tendency of the paper. I regret, of course, that the scientific question has not been more thoroughly discussed than it has been, but I feel sure that the discussion will go on in our minds, and that we shall come to some definite conclusions about it. You must recollect that such a paper as this has been in my mind ever since the Estimates were moved for last year, when there was a vote on a loan of 3,000,000*l.* for fortifications side by side with a reduction in the Naval Estimates of 900,000*l.* That, I may say, was the moving spirit behind me, and I do believe that if this audience were called upon to pronounce upon a similar proposal now, it would not be carried. There is just one question which I might mention. It was put forward by Sir John Stokes, the very old argument that as the Navy was weak, and as the Navy could not at the present moment have the command of the sea which we desire for it, we had better go and spend the money on fortifications on that understanding. The chief reason adduced why we should take that course appeared to be the question of time. It is held that we could provide fortifications more quickly than we could the necessary naval force. I altogether differ from that. My impression is, if it is a question of time for the defence of the coaling stations, we can more readily get merchant ships fitted up with whatever guns can be had, than we can mount the same guns on land. And these guns, so mounted, are not only competent to protect the port, but to protect the shipping which make the port. That is the argument. I do not mean to say how that is. I must thank you, Sir, very heartily, for taking the chair during the discussion of a naval subject of this kind. I give myself credit for policy in asking you, Sir Frederick Stephenson, to take the chair. I felt this, that if you took the chair and read my paper before taking it, which you did, it would be certain that I should say nothing in that paper which would be hurtful to the feelings of the sister Service. I knew very well that if you were in the chair we should not get hotter than we need get, and I felt that your presence in the chair would bring together a large military audience, and would give a guarantee that I was not, as some speakers do really seem to think, putting the Navy against the Army, which is the very last thought in my mind. What I have said in the paper, and what I must repeat now, is, that I am afraid that if the Navy and the Army do not join together in these discussions and come to definite conclusions as to their relative positions under the changed circumstances of warfare, a great deal of money will be spent, and, as the public say, they will get nothing for it. But if the Navy and the Army can thus settle what their functions are to be, even the Ministry of Defence, which Sir Lintorn Simmons is so anxious to have, would become not a necessity, for we should have settled all the points which the Minister of Defence could settle, before he was appointed to his post.

The CHAIRMAN: Gentlemen, at this late hour of the evening I shall confine myself to very few remarks indeed. In the first place, I think the gallant Admiral may be satisfied on one important point, and that is the vital importance which we all of us attach to the supremacy and the most thorough and complete efficiency of the Navy. I think that is a point upon which we all agree, and I need hardly satisfy his mind upon that point. I only wish that one half this feeling were prevalent throughout the country at large, which is awaking at last, we must all be glad to see, from the indifference, not to say the apathy, with which it has viewed the important and vital question of the national defences of the country. There is one other point upon which I hope the gallant Admiral may also be satisfied, and that is that the requirements of the Army for carrying out these national defences are not likely, I should hope, to interfere with the claims which the Navy may make upon the public purse. The Navy, of course, are entitled, and I hope they will get it, to the first and the fullest consideration; but there are also some points upon which I think also the Army may have some slight claim as well. Gentlemen, with regard to the reply the gallant Admiral has made, I think it may possibly qualify to a certain extent the impressions that existed in the minds of those who spoke with regard to the subject of his lecture, for he now tells us that he is perfectly alive to the necessity of a certain amount of defence to our ports, our arsenals, and our

coaling stations. Now that, I confess, I understood was the very bone of contention, it is the very subject I understood of his lecture; however, I am very glad to find by this expression of his opinion now in his reply that we are all at one upon this. It is unnecessary almost to dilate upon the absolute importance of the defence of our arsenals, our ports, our coaling stations, and, I should like also to add, of the principal of our commercial ports, certainly towards their sea fronts. With regard to the coaling stations, by putting them in a proper state of defence, we surely keep the Navy from the necessity of protecting them to a very considerable extent, and we give the Navy thereby a freer hand to act upon our lines of communication, instead of detaching certain vessels to hang about these coaling stations, which for the time being are perfectly capable, or should be made perfectly capable, of defending themselves. I think, however, in this respect there will be no wish to make any claim upon those funds, which, I hope, will be almost, if not entirely, devoted to the efficiency of the Navy. I have only one thing more to do, and that is to ask you to allow me to convey to the gallant Admiral our very sincere thanks for the able manner in which he has drawn up his paper. I think we are excessively indebted to him for it. I think also we are still further indebted to him for this, that in bringing forward his paper, he has done so in the most disinterested and broad-minded spirit. He has wished under no circumstances to cram his views down our throats; on the contrary, his object has been to elicit and draw forth the freest possible discussion upon all points, and I think, considering the very full attendance which he has had at his lecture, and at this adjourned discussion, he may be fully satisfied that his wish has been thoroughly carried out.

Friday, February 22, 1889.

ADMIRAL THE RIGHT HONOURABLE THE EARL OF CLANWILLIAM,
K.C.B., K.C.M.G., Member of Council, in the Chair.

OUR NAVAL POSITION AND POLICY.

By the Right Honourable LORD BRASSEY, K.C.B., &c., &c.

HAVING dealt with the amount of building required in the Navy, in an address recently delivered at the Mansion House, I propose to-day to treat of our shipbuilding with reference to types, and to close with some remarks bearing on the efficiency of our Dockyard administration. I am fully sensible that the undertaking is hazardous. I am encouraged to persevere by the controversies of the experts. It may be that a mere layman, after calmly hearing both sides, may reach conclusions not unworthy the consideration of those who, if they know more, are perhaps less able to be impartial.

I commence my task with a brief review of recent shipbuilding abroad and at home. Having traced the direction which contrivance and invention have lately taken, we may perhaps find some indications to guide us in our programme of shipbuilding for the near future.

First, let us review the ships building abroad. In the class of battle-ships, France has adhered chiefly to a type much admired in our own Navy. The French ships are defended by a continuous belt, and they have the advantage of a high freeboard. In our ships the heavy guns are better protected, and recently we have established a decided superiority in speed. The Italian constructors, while building vessels of the largest dimensions as yet accepted, have thrown off belts, preferring other methods of protection for the vitals of ships. In armaments, and in armour for the protection of guns, in speed, and coal endurance, their ships are matchless. The Germans are imitators rather than pioneers in matters of construction. The United States, after a long pause, are adding to their Fleet several ships, in which are combined the best features of recent construction elsewhere. The Russians are throwing their main efforts into turret-ships heavily armoured and armed.

Neither abroad nor at home are the constructors allowed to pursue their way unchallenged by criticism. In England, among ships of recent construction, the "Admiral" class and the belted cruisers are the types which have been most criticized. These classes are so numerous represented in the Navy that it would be little short of a national disaster if we were driven to regard them as absolute failures.

Of the "Admiral" class we have built six, and they have cost nearly four and a half millions sterling. Sir Edward Reed would remove the "Admirals" from our list of battle-ships on the ground of deficiency of protection at the water-line. Admiral Hood and Mr. White, in their evidence before the Select Committee on our Navy Estimates, refused to concur in this condemnation. Referring to the risks of the loss of stability by the penetration of the unarmoured sides near the water-line, Mr. White told the Committee that the "Admiral" class would fight with risks of the same kind as the ships with narrow belts of foreign navies. His views were confirmed by Admiral Hood, who said that, for the fighting purposes of a ship, under the usual conditions as he found them at sea, his experience led him to the opinion that it was not of vital importance whether the upper edge of the belt was flush with the water or 18 inches above the water-line. Whilst expressing a favourable opinion generally of the "Admiral" class, Admiral Hood had considered it desirable to give more protection to the "Nile" and "Trafalgar" class, for the designs of which he was personally responsible. In these two ships the 20-inch steel-faced armour is reinforced by inner armour with a strong system of girder work. The armour is not only thicker, but it extends over an area of side considerably larger than in the case of the "Admiral" class. It is important to take note of the sacrifices required to secure this increased amount of armour. The tonnage has been raised from 10,600 to 12,000 tons, and the cost from 729,000*l.* for each ship to 854,000*l.* An addition of 1,400 tons to the displacement, and an increased expenditure of 124,000*l.*, is the price which it has been necessary to pay for the additional defensive power of the "Nile" class. There has been no development of offensive power in the later ships. In point of speed and coal endurance, the "Nile" and "Trafalgar" are somewhat inferior to the "Admiral" class, although their armament is approximately the same.

A general summary of the fighting efficiency of the "Admiral" class was given by Mr. White, in answer to a question put by Mr. Maclean, a member of the House of Commons Committee. Mr. White pointed out that the "Admiral" class had an armament of unrivalled power. The disposition of the armament was, by the common consent of naval authorities at home and abroad, the best afloat. The guns were carried high above the water; the auxiliary armament was very powerful. The claim put forward for the "Admiral" class, that they should be rated as battle-ships, was not, in Mr. White's view, to be disallowed because their belts were narrow and did not go to the ends. His definition of a battle-ship was a vessel which, carrying heavy guns, has its auxiliary guns mounted in armoured stations and has the vitals efficiently protected. He considered that the Italian ships, the "Sardegna," the "Umberto," and the "Sicilia," were battle-ships of the first rank. They had no side-armour, but they had strongly curved decks and a magnificent armament, all the heavy guns and the hydraulic and other mechanism necessary to the working being protected by thick armour.

It will be admitted that the "Admiral" class would be more

satisfactory if they had more protection by armour. Keeping within the limits accepted as to size and cost, and having a fixed amount of weight available for armour, it might have been preferable to take something from the armour on the barbettes, in order to give more protection to the battery. It is questionable whether it would have been expedient to give an additional proportion of weight to the protection of the water-line.

Let us pass on to the belted cruisers. Seven vessels of this type have been built at an expenditure of three and a half millions. The position of the belt has been made the ground of a severe condemnation of these vessels. The Admiralty witnesses were closely questioned by the Committee on the Navy Estimates as to the efficiency of the belted cruisers. Neither Sir Anthony Hoskins nor Admiral Hood nor Mr. White concurred with the critics in attaching a vital importance to the position of the protective belt. Sir Anthony Hoskins gave his views in the form of an argument. He did not think it wrong to send the ships to sea, though he would have wished that the mistake in the calculations for the construction of the ships had not been made; but, while making this admission, he urged that the armour belt was placed on the ship's sides for the protection of the vitals. As the ship goes down in the water, the vitals are submerged and thereby protected: as the ship lightens, and the vitals become exposed to shot, the belt also rises and gives protection. It is undesirable that a ship should have a greater draught than she is designed for, but in the case of the belted cruisers the vitals are equally protected, whether the armour be above or below the water-line.

In the important element of speed the belted cruisers have more than fulfilled the conditions laid down for the original design. Outside Plymouth breakwater, the force of the wind being 8, the "Orlando" steamed 13·8 with one-third power, 16 knots with two-thirds power, and 17·141 with forced draught. In the smooth water off the Maplin Sands the "Immortalité" did 19½ knots with forced draught. The gunnery trials have been satisfactory. Belonging to the class of protected rather than armoured vessels, the belted cruisers do not seem to merit the condemnation which has been passed upon them for deficiency of armour. It is perhaps the greatest defect of this class that, as at present armed, they require a complement of more than 500 men. In war it would not be desirable to place such large numbers in a mere protected cruiser. All our cruisers, as Admiral Baird pointed out to the Committee on the Naval Manœuvres, are overloaded with armament. Mere weight of armament will not make an unarmoured ship a battle-ship; and if regarded, as they should be, as cruisers, our belted vessels are far more heavily armed than French cruisers of corresponding tonnage. The "Cécille," of 5,766 tons, carries no gun heavier than the 5-ton gun. In the case of the "Pie Monte," recently purchased by Italy from the Armstrong firm, the armament was changed from heavy pivot guns to four 111-pounders, quick-firing guns, mounted on sponsons, two on the bow and two on the quarter. If the armaments were reduced the complements could be reduced. The comfort of the crews of Her Majesty's ships is not

undeserving of consideration. Manned as at present, the belted cruisers are overcrowded, and the discomfort caused by the want of space is aggravated by insufficient ventilation. This should be, and can be, remedied. Defective ventilation is a frequent and a grave fault in our ships-of-war. It makes the heat below intolerable. The falling off at sea from the speed at the measured mile is largely due to the closing up of openings while completing ships for commission.

Of the vessels which have commanded general approval, it is not necessary to say much. The "Victoria" and the "Sans Pareil" are the most powerful single-turret ships which have yet been built. They carry a pair of 110-ton guns in a single turret. The bow fire will be of crushing power. The auxiliary armament is very formidable; but the guns are fought behind easily penetrable armour. If shells are employed with high explosives, a corresponding defence by armour will be required for all the fighting positions in the ship.

In reviewing our most recent proceedings in relation to ship-building, the decision taken by the Admiralty, as reported in the public prints, in relation to the refit of the "Minotaur," seems open to criticism. For war, the value of these ships depends mainly on their speed and coal endurance. In this regard they can never be satisfactory so long as their old-fashioned engines and boilers are retained. An expenditure of 50,000*l.* is wasted on a policy of half measures. With triple expansion engines and suitable boilers, the ships would have a high speed and good coal endurance; with our old engines and old boilers they will have neither the one nor the other.

In the cruisers laid down by the present Admiralty, speeds rarely attempted before in vessels of corresponding dimensions have been reached. In the "Blake" and the "Blenheim" the dimensions have been carried to 9,000 tons. It has been found necessary to accept these unprecedented dimensions in order to secure decided superiority over the latest cruisers in construction abroad. Without entering into the details of the design, the "Blake" class may be regarded as a type of which we shall require more than two to give effective protection to our fleet along the great ocean highway to Australasia.

In the recent construction for the Navy, the building of gun-vessels of the "Pheasant" class would seem to yield the least satisfactory results. The great improvements which mark the new class of gunboat will at once be admitted. It is sufficient to walk round the steam basin at Portsmouth, and to compare one of the new class with the "Medway," to appreciate how great has been the advance in the later designs. It is, however, a question whether powerful cruisers are not more necessary than gunboats for the reinforcement of the Navy. For the police of the seas we have no lack of vessels on the Navy List. If our gunboats are worn out or obsolete, it might have been feasible to utilize the corvettes of the "Gem" class and the "C" class. With reduced armaments and reduced complements our corvettes might have taken the place of the sloops, and our sloops might have relieved the gunboats.

Passing from ships lately built or building to the programme for

the future, it should be the first object to strengthen the Fleet in the line-of-battle. In ships of the first class, offensive and defensive powers not inferior to those of the "Nile" and the "Trafalgar" will be insisted upon. The new vessels to be laid down should not be mere repetitions, but, if possible, improvements upon their predecessors. It would be a vast improvement if our battle-ships could be constructed with those lofty bows which give to ships of the "Alexandra" and "Hercules" type a conspicuous advantage over later models when steaming at speed against a heavy sea. Such an improvement might be realized in a design having a bow- and a central-battery as in the "Alexandra." The disposable weight would be represented by a turret armed and armoured as in the "Nile" and the "Trafalgar." Their great cost, falling little short of 800,000*l.* for each battle-ship of the first class, renders it impossible to multiply such vessels beyond a certain limit. It is necessary to turn to smaller types, and of these none would appear to give greater promise than the armoured ram.

Dealing with a professional topic, it will be more impressive if the views of a layman can be conveyed in language borrowed from members of the naval profession. No navy has displayed more original genius in construction than that of the United States. In the Report of the Secretary for the United States Navy of 1870, the marine ram is alluded to as "a new element which promises, when constructed upon sound principles, and in forms of special strength for its particular and appropriate service, to be a weapon of most destructive warfare." The value of rams was specially insisted upon by the Admirals who had commanded during the Civil War, and who at its close were requested to draw up reports for the guidance of the Naval Department in relation to shipbuilding. Amongst these experienced sea-officers none perhaps wrote more clearly and more forcibly than Admiral Goldborough. Arguing that no ship of rational dimensions can support throughout her exposed parts more than a very limited thickness of iron plating, and that the strongest armour can be but of poor account unless other elements of efficiency, and notably that of celerity in turning, are secured, he insists that every ironclad, as a matter of course, should be an unexceptionable ram. This she could not be unless capable of being directed with a great degree of promptness to any desired quarter. Velocity was of primary importance; it made the vessel herself a terrific projectile. "The value of rams," he said, "at this moment cannot be over-estimated. With a few in each of our prominent commercial ports no enemy could blockade them. Rams intended for purely harbour defence would be better without guns. They themselves would be the projectile, the steam the powder, and the effect of both properly combined would be absolutely irresistible. To fit the rams with guns would swell the cost largely, and so abridge the multiplication."

Turning to the French Navy, the armoured ram was strongly recommended by Admiral Gougeard, the Minister of Marine under M. Gambetta. Admiral Gougeard's design, as described in the "Engineer," was intended to be armed with the torpedo as the prin-

cipal weapon, to have great speed, and to be protected by a steel deck; the floatability being guaranteed by means of cells filled with buoyant material. The type contemplated by Admiral Gougeard is represented in the British Navy by the solitary "Polyphemus." A ship for the same purpose could be designed of a more solid and yet less costly construction. The superstructure could be simplified, the torpedo armament reduced, the thin but expensive armour of Whitworth steel plating being replaced by more solid but less costly armour.

That rams alone would not constitute a satisfactory or efficient fleet for the general duties of the Navy will be obvious. Enough, perhaps, has been said in support of a proposal that some vessels of this class should be taken in hand. In combination with our line-of-battle ships armoured rams would be of great value.

Passing to the cruisers, the "Blake" and "Blenheim" have been already mentioned. In the construction of vessels of more moderate dimensions, we have to make our choice between various designs recently produced. We have in our own "Leanders" models of symmetry with great speed. Among cruisers lately built, of comparatively small dimensions, the "Pie Monte," as described by Lord Armstrong, is a vessel which presents a remarkable combination of armament and speed on a displacement of 2,500 tons. The "Medea" and the "Medusa," now completing for our own Navy, represent a satisfactory design for a swift cruiser of moderate dimensions. Fast cruisers of this type are essential in European waters. The swift sea-keeping torpedo gunboat is a type of vessel most valuable for the purpose of blockade, and as an auxiliary to the heavier ships. We need a large reinforcement of this class.

To conclude this part of my subject—assuming our normal expenditure on shipbuilding to be on the scale proposed in the address which I had the honour of delivering before the Chamber of Commerce—that is to say, double the amount of the appropriations in the French Estimates, and assuming our expenditure at the present time to be in round figures three millions annually, equally divided between the armoured and protected classes—our programme of construction should enable us to add every year to the Fleet the following list of vessels: 1 battle-ship of the first class, 3 armoured rams, 2 "Blenheims," 3 "Medusas," and 8 "Sharpshooters." The shipbuilding policy for the British Navy must be adapted to the circumstances of the time. It will always be possible, by means of a special effort, to make additions to any particular class of ships in which it is thought that we are deficient. Supplementary Estimates on the one side must be met by Supplementary Estimates on the other.

From shipbuilding I pass, by a natural transition, to the administration of those great establishments in which our ships are built. It has been the custom to hold up the Dockyard administration to contempt. We have recently had a more favourable opinion, and from an authoritative source. The Dockyard expense and manufacturing accounts, those important combinations of figures in which the whole results of the manufacturing operations of the Dockyard are built up

into a comprehensive balance-sheet, have lately, for the first time, been submitted to the searching audit of the Comptroller-General of the Exchequer. That high authority expresses satisfaction both with the principle on which those accounts are prepared, and with their accuracy in detail. The results of a test audit lately for the first time applied by the Treasury to the Store Accounts are equally satisfactory.

As to the comparative cost of Dockyard and contract building, we have the evidence of the Director of Dockyards, who has come fresh to his post after a long and successful career in the private trade of the country. Asked his opinion by the Committee of the House of Commons on Navy Estimates, Mr. Elgar considered that, as the contractors could build a merchant ship more cheaply, so the Dockyard had the advantage in building ships of war. He expressed himself well satisfied with the Dockyard workmen both for skill and diligence.

As to the time occupied in building we have achieved immense reform. We have been making steady progress for some years in accelerating construction; but the "Trafalgar" has eclipsed anything that had before been achieved. It is hoped that she will be ready for the pennant next June, or three years and six months from the time when the keel was laid. Certain it is that the British Dockyards compare favourably with those under foreign administration. In Italy the "Duilio" and the "Dandolo," laid down in January, 1873, were ready for commission in January, 1880, and March, 1882, respectively. The "Italia" and "Lepanto," laid down in January and September, 1876, were ready for commission—the former in October, 1885, the latter in May, 1888.

Turning to the French Navy, the ironclads now in construction—the "Neptune," laid down at Brest, and the "Magenta," at Toulon, in October, 1880—will not be ready for their trial before 1890. The "Formidable," laid down at L'Orient, and the "Amiral Baudin," at Brest, in December, 1878, will be ready for their trials in the present year. The "Hoche" and the "Marceau"—the one building in the Dockyard and the other by contract—were both laid down in 1880. The "Marceau" will be ready this year. The "Hoche" is $\frac{2}{10}$ ths short of completion. The delay in completing in France is more striking still in the case of smaller vessels. Of the four armoured gunboats laid down in 1882, one of 1,640 tons and one of 1,050 tons will be ready this year; another pair, one of larger and the other of smaller size, will be advanced to $\frac{4}{10}$ ths and $\frac{4}{10}$ ths respectively. The torpedo cruiser, the "Vautour," of 1,280 tons, commenced in 1882, was only completed for sea in 1888.

It is difficult to compare the cost of work in the French and English Dockyards. In the French Dockyards the number of workmen is 21,000, and their average earnings are 40*l.* a-year. The number of workmen in the English Dockyards is 18,047, and the average earnings exceed 65*l.* a-year. With this remarkable difference in the scale of the wages, the cost of building appears approximately the same in the two countries.

In comparing a Dockyard with a private establishment we must always keep in view that our establishments are primarily intended to deal with emergencies and for the general purposes of the Fleet. There must be a larger expenditure on various services than is strictly necessary to carry out the work of mere building in ordinary times. In late years, more particularly under the present Board of Admiralty, improvements have been effected in Dockyard administration. While recognizing that much has been achieved, there is still room for improvement. Money is wasted on the maintenance of ships practically useless for the defence of our shores and our commerce in the event of war. The steam basins have been filled with vessels efficient only for peace purposes, in process of refitting at great cost for the relief of other vessels of similar type, which it has been the inherited policy of the Government to keep in commission for the police of the seas. Progress has been made in cutting down the cost of repairs and refits. For a further and considerable retrenchment we must look to a radical reform in the constitution of our foreign squadrons. On the Australasian station and China no material reduction may be possible. On the East Indian station the trying work of the Red Sea, or some portion of it, should be handed over to the Indian Navy. Lascars are better fitted to contend with the climate than crews of Englishmen. Elsewhere the vessels permanently kept on the stations should be reduced. Our flag should be shown, and the Navy should be trained in flying squadrons. A system similar to that so long maintained in the British Service has been followed under the French Administration, and it has been most strongly condemned by the ablest naval writers in France.

LORD BRASSEY: I greatly regret that it has not been possible to circulate the print of this paper beforehand, as usual. I only returned to England six hours ago.

ADMIRAL COLOMB: We must regret that a paper of this kind was not in our hands before, as it is one which deserves closer criticism and fuller argument than it is possible to give to it when we hear it for the first time. The noble lecturer led off by raising that fine discussion, the question of the armoured water-line—a question we have discussed over and over again in this theatre, and I cannot see that we are one whit nearer the solution of it now than we were twenty years ago. To my mind that has been a question for the decision of experiment long ago, and nothing but experiment will settle it. I am satisfied myself that the necessary experiment is not a very expensive, and need not be a very prolonged one. We do not know at the present moment what chances there are of the water-line being hit in dangerous places according to the proportion of shot which is fired at the ship. We have really only one experiment: that is the capture of the "Huascar" by the two Chilean ships. She sustained a very heavy fire from 12-ton guns, and no shot struck her between wind and water, that is to say, the necessity of a water-line belt was not impressed upon us by that one experiment, the only experiment that we have that I know of. I believe myself that it is very difficult for a rifle shot to strike at that point which used to be called "between wind and water." In the old wars a shot very seldom struck between wind and water, and we know this much, that with round shot it is much more easy to strike between wind and water than it is with rifled shot. The rifled shot invariably on striking the water flies up to a great height, generally clean over the ship, whereas the round shot, if it struck a little short of the ship, took a small bound, and was very apt to strike near the water-line. Those are facts that we know; to get more we should, I consider, put up a

target and fire at it every day for a fortnight, and try to strike the water-line with a given number of guns of different calibre, and to ascertain exactly what danger there is. When we have ascertained what danger there is, it seems to me that we shall be in a much better position to decide that great question. As long as we do nothing but express opinions about it—which we have been doing for twenty years steadily—I do not quite see how we can get any further. I quite agree with Lord Brassey in deprecating a too sharp criticism of the work of the naval administration of this country. I think, while it is perfectly right and very valuable that those of us who profess to know something about it (whether we do or not is another question) should offer criticisms from time to time, making those criticisms as valuable as we can, still I deprecate the sort of *primâ facie* hostility to an administration which sometimes colours the discussion of this subject. Those who know what goes on know very well that the public servants, both in the Admiralty and in Dockyards, are almost as a universal rule doing their very best; and, as a rule, they are doing their very best under considerable disabilities. In a country governed as we are by a wayward House of Commons, it becomes exceedingly difficult for those who know the truth to tell out that truth into action without deviation from one side to the other. Lord Brassey has criticized the crowds of obsolete ships which a little time ago were to be seen in our Dockyards. They are almost disappearing. I have myself been a hostile critic against those classes of ships, but, after all is said and done, I do not think that the thing could well have been helped. A great battle had to be fought between the old propulsive power and the new propulsive power, and there was no way of fighting it out except by that continued experiment which, as all continued experiments do, developed a very large number of failures which decorated the Dockyards as Lord Brassey has told us. But that time has passed away. Steam has won the battle against sail, and every one's mind has become clearer now that that battle has been fought and won. As to the actual necessities of our ships, no person who has been observant of the shipbuilding policy of the Admiralty for some years past can doubt that we are coming to more steady types of ships, if I may say so—coming to more reasonable arrangements in the ships themselves, coming, in fact, to a time when we shall have patterns suitable to steam propulsion in the same way as we used to have patterns most suitable for sail propulsion. Lord Brassey has spoken once or twice with the great vigour, clearness, and force which accompanies most of what he says, on the plan which we adopt of stationing our ships not so much in squadrons, but more separately on the different stations. I am not sure that I wholly go with him in his view that there ought to be less of the separate station and more of the squadron station. My experience of squadron work is that a little of it goes a good way. Though it is perfectly right that all Officers should be accustomed to work in squadrons, because in the heavier classes of ships, in battle-ships, all the work is done in squadrons, yet it does not follow, and it did not follow in times gone by, that all of the work of the Navy was done in that way. It has been remarked to me once or twice, and I think that there is a great deal in it, that our practice of separating the ships, leaving Captains to their own devices, throwing the responsibility on their own hands, and taking away from them the power of appeal to the Admiral, is a good thing for the Officers. I believe the number of small vessels which we have had in our Navy, throwing great responsibility, sometimes on comparatively young Officers, has developed in the British Officer a quality which we do not see in those of other navies, and which other navies fully acknowledge, that is to say, a freedom from fear of responsibility. This characterizes the British naval Officer, as far as I have studied him, over the naval Officer of any other country. I should be very sorry to see the British naval Officer commonly put under the command of the superior Officer. Give him as much of the squadron work as is necessary, which is now done on all stations, but do not suppose that you can train the British naval Officer, as a rule, in squadrons. There is one other point which I ought to speak about, as Lord Brassey did me the honour especially to allude to my views on that subject, and that is placing the turret in the rear of the ship instead of in the front in the case where there is but one. My own view for a great many years past has been that in the "Hero," and that class of ship, the proper place to put the turret is in the rear and not in the front. I have never been able to see why the turret

was placed in the bows of the ship. The only advantage that a ship can possibly get from it if she is chasing an inferior ship is that she will be able to fire on her without material yawing. But the time occupied in loading these heavy guns is so great that this is not a very material advantage. When her turret is placed astern instead of in front she will be able to chase at full speed without the guns being washed down as they now must be, and a very slight yaw, a yaw of three or four points at the outside, will give her on the vessel ahead of her the full power of her guns. But, on the other side, in the one experiment we know about, the capture of the "Huascar," we saw the great evil of placing the turret in the front of the ship and not in the rear. That ship was attacked by a superior force. She made a wonderfully gallant fight, but she was absolutely handicapped because she had to fly and at the same time to fire at her enemy, and she could not do both. It was necessary for her to turn out of her course considerably every time she wished to fire at the enemies following her astern. If she had been with her turret astern she might, I verily believe, have saved herself altogether. It was the accuracy and difficulty of her fire which prevented her from making good her escape and enabled the enemy to capture her.

Admiral the Right Honourable Sir J. C. D. HAY, Bart.: I shall not occupy my ten minutes, nor do I propose to enter into all the very valuable points which are discussed in the paper, but there are one or two to which I should like to call the attention of the meeting, and which, I hope, may at least lead to further discussion on those particular parts of the paper which to my mind are very valuable at the present moment, when we understand that there is to be a Bill introduced into Parliament for the purpose of increasing the Navy, none too soon. I agree with the noble lecturer in the value that he places upon the "Polyphemus." The "Polyphemus" is a ship that can go 18 knots, and, I believe, that if the gold medal of this Institution were offered for a scheme to be propounded by naval Officers by which the "Italia" and her sister ships could be captured, we have no other ship in the Navy at the present moment which is capable of keeping up with the "Italia" or the "Lepanto" at their speed of 18 knots, and at the same time doing anything in the way of injuring them. Therefore I think it is necessary that we should have more "Polyphemuses." I hope we are not going to war with Italy, but if we were we have no ships in the Navy that can go 18 knots and carry guns of an equal weight and power to those carried by the four great Italian ships. I observe the lecturer states that the number of battle-ships must be limited because they cost 800,000*l*. I think I am reducing his sentence absolutely to what it means. Well, they must be limited, of course, because they cost 800,000*l*., but they must be limited by the necessities of the country. We require as many battle-ships as all the rest of the world combined. We have a Return before Parliament which states—I assume it is accurate—that we have forty-nine battle-ships at this moment, of which eight are inefficient from want of repair; but I see in the Report lately made by Sir William Dowell and his colleagues, it is suggested that they should be repaired at the cost of a million of money. However, at this present moment they are inefficient; and there are seven, which, I understand from the statement of the First Lord of the Admiralty, being over twenty years old may be considered as past work. That leaves us thirty-four. The French Navy in the same Return is stated to have thirty battle-ships plus six which are called coast defence ships, but which steam 14 knots, which have large coal capacity, are as powerful as any of ours, and are always recognized as making up thirty-six French ships, from which we must deduct four as inefficient and three as old, reducing the French ships with the same kind of reduction that we have allowed for the British Navy, to twenty-nine. Then the Russians have nine, from which we must deduct one, reducing them to eight. The Germans have thirteen, from which we must deduct three similarly, reducing them to ten. The Italians have twenty-one, from which we must deduct nine, reducing them to twelve. Spain and Turkey are not given in the Return, but from authentic sources we find that the one has four and the other six, thus making altogether sixty-nine battle-ships belonging to these nations. Therefore if this country, as I think it should have, is to have the same number, that is sixty-nine, we should require to build thirty-five battle-ships, which is the number I suggest to my noble friend—thirty-five at 800,000*l*. apiece, or whatever the sum may be that may be necessary, for the country to be defended,

and in my opinion the country will not be defended unless you have as many battle-ships as the rest of the world combined. It is said, of course, it is possible to repair these eight ships of the "Minotaur" class, and others, and make them efficient for a million of money. If that is the opinion of persons in authority I shall bow my head to their opinion, and that would reduce the number wanting to twenty-seven. But I am not convinced that it is so. I think these ships should be repaired, but that they are only fit for armoured cruisers and not for battle-ships, and, therefore, I come back to the number which I think is absolutely necessary to the country, which is thirty-five battle-ships to be completed. If those thirty-five battle-ships are completed, I believe the ordinary building of the Navy, three millions, which I think my noble friend suggests, will be sufficient to give us an efficient Navy, but we must have an extra expenditure of something like twenty-seven millions to give us the thirty-five ships which are necessary for our safety. I am well aware that my opinion is worth very little, but I submit it to the investigation of those who are interested in the matter to find out how, if we were at war with two great Powers, such as France and Italy or France and Russia, we could manage to keep them in order and to protect ourselves entirely, unless we had such a preponderance of power as that which I suggest. I think that this country should possess one battle-ship for every battle-ship in the world which could possibly be opposed to it, and then, under any circumstances of one, two, or three Powers being united against us, we should have such a preponderance that we could sweep the sea. Therefore it seems to me that that should be the object at which we should aim, and that is the limit to which my noble friend's 800,000*l.* should be extended, in order to meet the defence which is necessary for the country. I agree with Lord Brassey's remark as to the "Nile" and "Trafalgar," except this, that if these ships are a type to be adopted, or if the "Victoria" is a type to be adopted, they should in my opinion have the sea-going advantage of the high bow upon which my noble friend has laid such stress, but they ought also to have the speed of over 18 knots at whatever cost, in order that the Italian ships, or the Russian ship now building of that speed, or the "Amiral Baudin," or any other armour-clad should be caught by, defeated by, arrested by, and brought into port by the British ship. My gallant friend Admiral Colomb has laid down some theories with regard to the number of shot which would strike a ship, in which I have no doubt he is accurate. A very small number of shot do strike a ship. The very best frigate action ever fought was the action between the "Chesapeake" and the "Shannon." It may astonish people to know that these ships having been fought in the most determined manner and with the greatest gallantry, there were only forty-nine hits in the "Shannon" after she came into Halifax. She was only struck forty-nine times by the best Commander and the best fought frigate that ever fought an English frigate. It may occasionally happen that a ship may be sunk, but as a matter of fact they haul down their colours before that stage is arrived at. I trust that these ships, which have their protected line below water, will be very useful, and that they will not always remain in that condition. I do not despair of them. What I did object to was the designers of those ships saying that they proposed to build a ship that should have protection, and when the ships were launched we found this protection under water. That is a faulty design which cannot be defended. I dare say it is a very difficult thing to design a ship, and I am aware that additional weights come to be put into them for which they were not originally intended, but additional weights ought to be contemplated, and there is a mistake somewhere if ships are launched not fulfilling that amount of protection which their designers intended. It is only on that ground that I conceive we have any right to challenge the value of these ships, which, I believe, will do good service to the Navy.

Captain CAMPBELL, R.N. : Perhaps I may be allowed to make one or two remarks on the paper which has been read, as I happened to have the honour of serving as Commander of the "Alexandra" for three years, which vessel has been referred to as typical on the question of the turret being aft instead of forward, in order to drive the ship at speed against a heavy sea. Steaming in the "Alexandra" against a gale in really heavy weather was one of the most fearful things I have ever witnessed. The seas would come in clean over the bows : the structure forward was not sufficient to keep them out, and great difficulty was experienced in getting the

water off the ship afterwards. I believe in the "Dreadnought," and vessels of that class, they get on against a gale of wind very much better than the "Alexandra" with all her top hamper and deck batteries would do. I see Admiral Colomb says the turret ought to be in the after part of the ship, but I hope in future we shall have turrets in both parts of the ship. I do not think we shall very often have to fight a stern fight running away from the enemy, and we shall still want the turret in the fore part of the vessel for chasing purposes. I cannot quite agree with Admiral Colomb that the yaw of the ship is not a great loss to a vessel chasing another—it would be very much better if it could be done without. Coming to the whole question of national defence, we were told only yesterday in another place that what is called "warlike preparation" abroad is only "peaceful precaution" at home, but to my mind those terms are synonymous, because we know perfectly well to preserve peace we must be in absolute preparation for war, and that is the only way it seems to me that we shall maintain the former state. The other day Admiral Colomb said in this Institution—he will excuse me referring to him so often—that we do not know what we want, that is, I think, the expression he made use of. What we want is to be able to keep the enemy's ships in their ports all over the world, no matter what war we may be waging at the time. That is the measurement I should use for the strength of the battle-ships, you must have battle-ships; as long as you have large guns to fight against forts you must have large carriages to carry them about in safety. After that you want a very large number of ferrets, because I believe British Admirals in the future will not wait blockading outside all the time, but they will shove in their ferrets and rout the enemy out somehow or other. You will want plenty of ferrets to do that. Then naturally there will be some of the enemy's vessels that will escape—those fast cruisers that we all hear are going to destroy our trade; and you will require these hounds in the shape of your cruisers to catch them and take them into port. These, therefore, are the three things I think most necessary in any policy of naval shipbuilding, which I am glad to say we are likely to be studying very soon. There is another thing which I should like to say, that has little reference to the maritime part of the subject, as it is called into question by the large audience in this theatre, but I hope that it will not be very long before the members of this Institution are enabled by the Government, when a large number of ladies and gentlemen come to hear such papers as we have listened to to-day, to have better accommodation in a larger theatre.

Admiral Sir E. FANSHAW: As reference has been made to the performance of individual ships at sea, with a view to illustrate the respective merits of a high bow and the lower bow of the "Devastation" class, I may mention that when I was the Admiral at Portsmouth the "Devastation" arrived from the Mediterranean. She had very heavy weather as far as Gibraltar; and having stayed there only time enough to coal she came on to England against a heavy gale the whole way. She arrived on Saturday night, and it was my business to inspect her on the Monday morning, she coming into harbour to be paid off. She had been on a foreign station, and, I believe, in commission three years. She had steamed from Gibraltar to Portsmouth against a head sea, and all the fore part of the ship had been freely washed over by heavy seas the whole way. I went all over the ship. The seamen's mess-place in the fore part of the ship was described to me as having been the whole time perfectly dry. It was immediately under this part that was washed by the seas. I asked if no leakage had come in, and it was answered that there were only a few drops from the corner of a skylight which was battened down. They had had no time to clean bilges or do anything else than open the hatches for ventilation; yet I could hardly detect the slightest smell in any part of the ship. I could not help comparing this in my own mind with what would have been the case under similar circumstances with an old line-of-battle ship: which, instead of being a few days coming up from Gibraltar, would have been at least a month. I mention this as bearing upon the question of low bow ships behaving well in a head sea in heavy weather. I should like here to say how entirely I agree with what was stated about a strong Navy being conducive to the maintenance of peace. We often hear it said that the people who clamour for a strong Navy are bellicose naval Officers who wish to make war; but everybody who has intelligently considered the subject knows that a strong British Navy is the surest guarantee for the

peace not only of this country but of Europe; and I will add that we should not have lived for the last six or seven years in a feverish expectation, year by year and month by month, of a great European war, if England had, backed by a strong Navy, asserted with authority that peace should be maintained.

Admiral BOYS: I have not had the opportunity of seeing the paper, and we naval Officers, as a rule, are not quite capable of taking up a question to argue it at first sight, at any rate that is my case. I only rise to make one or two remarks; and, as Lord Brassey has asked for the expression of any difference of opinion, perhaps I may be allowed to put them. Lord Brassey, I see, advocates generally a reduction in the crews of our ships. Well, I must say, as a naval Officer, I would not take one single man out of any ship, for in a great many circumstances our crews are not only not excessive but insufficient. If there were sickness on board, or if some men were detached on duty, such as prize crews, we should hardly have men enough to man the guns and to perform the various duties of a ship. I believe that is the case now in some of our turret ships, that when the boats are away they have scarcely enough men to work the guns. Then about the high bows, I must say I have been rather astonished to hear the views that have been advocated by some of our leading Officers as to high bows for steaming against a head sea. In the first place, we are not to suppose that we shall fight all our actions in gales of wind or steaming against a sea. I do not think our ships should be exactly built for that purpose, but built for the occasion of fighting actions, which is more frequently the case in moderate than in heavy weather. I can give you a practical instance of what I thought was a great triumph for the low bow. It happened to be my duty some years ago to command the "Glatton" in some experiments to be made in firing at her turret by the "Hotspur" at Weymouth. I had to take the "Glatton" from Portsmouth to Portland for those experiments. In those days these low freeboard turret ships were not supposed to be very safe to move about alone, and the "Bellerophon" was ordered to accompany as a convoy. We steamed against a summer south-westerly gale. The "Bellerophon" having to keep further out never came near us: we got to Portland an hour before her, and while she was pitching her bows into a head sea we were going through it extremely comfortably. Of course a great deal of sea came over the decks, but it all ran off again. In that case I certainly considered the behaviour of the "Glatton"—it was not a very heavy sea—was better than that of the "Bellerophon," and she was a steadier gun platform. Admiral Colomb has expressed the view that he prefers the turret in the stern. I cannot say I agree with him there. But there is another device which will shortly come forward, and I dare say Lord Brassey knows of it, and that is instead of putting the turret in the bow or stern, putting it in the middle, and having an all-round fire in all directions, perfectly clear of everything. I think Lord Brassey is aware of what I am alluding to, and I hope soon the plan will be developed and considered.

Captain CURTIS: With respect to throwing responsibility on Officers and making them act independently, I think we must all recollect the case of Commander Johnstone at Madagascar, where he was in opposition to an Admiral, and how well he performed his duty there, and with great honour. As to money, three days ago I read a review of the Indian trade in the "Morning Post," and, if it is correct, then the money must be forthcoming, and the Navy must be increased in proportion to the duty that it has to do in the protection of commerce. It states that the trade with India has increased 50 per cent. in the last ten years, and 25 per cent. in the last twenty years. I think that speaks volumes to show that the Navy ought to be increased in proportion to the duty that it has to do: to ensure and keep inviolate our Colonies and commerce, which is the very essence of naval duties.

NOTE.—Our commerce and Colonies sprung from our naval supremacy; "it is our birth-right," and it is our duty to maintain it, and it has now become our necessity to augment the naval forces.—J. D. C.

Mr. KETTLEWELL: I should like to make one or two remarks. The lecturer spoke very highly of the "Polyphemus," and I think the general opinion of naval Officers here present is that she is a most efficient vessel. The idea has occurred to me very often—of course I do not pretend to much naval knowledge, being a layman—but still I cannot help thinking it would be greatly to the advantage of the Navy if there was a special type of cruisers thought out and built for service with an ironclad

fleet, which might also take the form of the ram suggested by the lecturer. Such vessels might fulfil the two purposes, as it seems to me, very well. There would be another advantage if this were possible, which is that such cruisers would not be likely to be detached for ocean duty in time of war, thus leaving the battle fleet short of auxiliaries. An army without cavalry can do very little in these times. It seems to me, a fleet of ironclads without having a large number of efficient cruisers attached to it would be very much in the same position. Could not a class of vessel be designed which would combine the fleet cruiser and the ram? I only throw this forward as a suggestion.

LORD BRASSEY: My Lords and gentlemen, I think the time has arrived when the meeting is desirous of closing the proceedings, and I believe it is my duty to say a word or two. First and chiefly I desire to express extreme satisfaction at the numerous attendance on this occasion. I take it not as a compliment to myself. The numerous attendance on this occasion is a reflection of the general state of public opinion, and is an evidence, among the many gratifying evidences which are before us, of the interest which the country is taking in its position as a naval Power. I thank my gallant friends for the tenderness which they have displayed in the criticism of the paper which has been placed in their hands. It was unarmoured at a great many points, and might have been riddled through and through by the naval gunners. I am thankful to them for having so mercifully spared me. I would, before I sit down, say this, that one of the most practical advantages of meetings in this theatre is that they afford the opportunity for discussion, comparing individual experiences, and so arriving at wise decisions. What we have heard this afternoon is very practical upon the question of the high bow. It is evidently necessary that our ships should be able to hold their way against contrary winds and heavy head seas. The inference one would draw from reading the Parliamentary paper which has been in the hands of the two Houses for the last twenty-four hours is that those who compiled that paper were of opinion that a high bow was necessary in order to enable a ship to hold her own in contending with a head sea. But that is not the experience apparently of Captain Campbell; and he is as good an authority as any other. He has served in a high freeboard ship, and knows her behaviour at sea. I think it is very important that such an experience as that of Captain Campbell should be placed before those who are in authority, and by whose advice the designs of the new ships have been supplied. Again, it is very interesting to hear from Admiral Boys of the comparative behaviour of the "Glatton" and the "Belierophon" in the circumstances which are described. Still further, it is interesting to hear what fell from Sir Edward Fanshawe. What, however, he did not tell us was whether the "Devastation" was steamed at such a speed as might be required of her in war on the passage from Gibraltar home. No doubt, if you ease down you keep safe on these low freeboard ships; the question rather is whether there must be a greater loss of speed, when speed might happen to be very necessary, with the low freeboard as compared with vessels having higher sides.

ADMIRAL SIR E. FANSHAW: I think I can answer that at once by saying from recollection I believe the "Devastation" came from Gibraltar to Portsmouth at the average speed of 8 knots.

ADMIRAL COLOMB: Having commanded the "Thunderer" under precisely similar circumstances, I might not be out of order in saying that I have had the "Thunderer," the sister vessel, in a gale of wind, and we have not been able to drive her at more than 3 or $3\frac{1}{2}$ knots, simply because we were being buried.

LORD BRASSEY: Well, there it is—the doctors disagree and there must be a further consultation. In the meantime it is a very important point. We all agree that we want to have vessels which can be depended upon for certain results, I do not mean to say in extreme tempest, but in that sort of weather which is very commonly experienced.

ADMIRAL SIR E. FANSHAW: That is the difference.

LORD BRASSEY: And I have no doubt that what is said here will be regarded as of value by those in authority. I have no doubt they will push their inquiry and arrive at a wise result. I must not pursue this subject further, but simply say I appreciate it as a great honour to be invited to produce a paper for consideration at this Institution. I beg to add, before I sit down, that I feel very much indebted to

my gallant friend Lord Clanwilliam for having given his sanction to these proceedings by taking the chair.

The CHAIRMAN: It is rather late, so I will not go into this paper, which we unfortunately did not receive till too late to study. It now becomes my pleasant duty to move a vote of thanks to Lord Brassey for having kindly given us this very interesting lecture.

NAMES OF MEMBERS who joined the Institution between the 1st January
and the 31st March, 1889.

LIFE MEMBERS.

Bruce-Kingsmill, J. C. de K., Lieut. R.A.	Anderson, J. H. A., Capt. Manch. Regt.
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MacFarlan, F. A., Lieut. Q's. O. Cam. Highrs.	Lance, F., Col. Ben. S. Corps.
MacFarlan, W., Lieut. 2nd Bn. Royal Highrs.	Cave, George E., Sub-Lieut. R.N.
Wilde, E. T. R., Col. 1st Tower Ham. Vol. Bde.	Dalgety, R. W., Col. York and Lanc. Regt.
Cave, John H., Vice-Admiral.	Napier, Robert A., Lieut. R.N. Reserve.
Barnes, E., Lieut. R.A.	Elphinstone, H. J., Lieut. The Highd. L.I.
	Eden, W. T., Col. late Bom. Army.

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Ethelston, A. P., Lieut. R.N.	Banbury, W. E., Lieut. Mad. S.C.
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Campbell, L. W. Y., Lieut. 25th Regt. Mad. Inftry.	Knocker, H. P., Major R.E.
Fraser, H. A. D., Lieut. R.E.	Macgregor, C. A., Major late R.E.
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McKirdy, John, Comr. R.N. Reserve.	Jones, H. S., C.B., A.D.C., Maj.-Gen. R.M.L.I.
Glyn, A. St. L., Lieut. 5th Bn. Rl. Fus.	Brine, B., Col. R.E.
Duke, O. T., Capt. 5th Bn. Rifle Bde.	Pearse, H. W., Capt. E. Sur. Regt.
Hill, H. B., Lieut. R.A.	Leslie, G. F., Capt. Rif. Bde.
Langley, Gerald C., Capt. R.N.	Western, J. S. E., Capt. Mad. S.C.
Macleane, A. D., Lieut. late R.A.	Daniell, J. F., Capt. R.M.L.I.
Inches, C. J., Fleet Eng. (retd.) R.N.	Paget, A. W., Comr. R.N.
Whitehead, G., Lieut. 24th Middx. Rif. Vols.	Pilcher, A. J., Lieut. R.E.
Cowans, J. S., Lieut. Rifle Bde.	Harrold, A. L., Major South Australian Mil.
Mayhew, C. G. A., Lt.-Col. N. Midld. Vol. Bde.	Macfie, W., Col. 3rd V.B. L'pool. Regt.
Hendrie, J. S., Capt. Canadian Arty.	Castle, W. H., Capt. 2nd V.B. Middx. Regt.
Cox, J. B., Maj.-Gen. Ben. S.C.	
Gunning, R. H., Capt. K's. R. Rifle Corps.	

OCCASIONAL PAPERS.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

THE CAMPAIGN IN THE NORTH SEA AND THE BALTIC.

(Eight articles from the *Moniteur Universel de Tours*. By RENÉ DE PONT JEST, 1870-71.

(I have thought it worth while to offer these articles in an English form to the Journal, as they throw so much light on modern naval warfare, on the thoughts and feelings of the Chiefs engaged in it, and on the circumstances and influences which governed their decisions.—P. H. COLOMB, *Rear-Admiral*.)

FIRST ARTICLE (*Moniteur Universel*, November 24th, 1870).

A GREAT many French and foreign newspapers have within the last few days announced that our North Sea squadron had forced the entrance of the Jade,¹ captured the Prussian Fleet, and was preparing to bombard Hamburg. They even gave, respecting the first of these exploits, precise details in adding that the flagships "Surveillante" and "Gauloise" had been sacrificed, and that they had sunk, opening the passage to the other ironclads.

Such news one can understand caused everywhere a great sensation; but confirmation of it was vainly sought in the *Moniteur Universel*. It refused to welcome lightly a rumour which could only be a fable, for unfortunately nothing which had been credited to our Navy either was true or could be true.

The Northern fleet being still composed, as in the early days of the expedition, of ships of heavy draft of water, the approach to the enemy's coast, studded with shoals, was for them impossible, and Vice-Admiral de Gueydon, in spite of his energy, had been obliged to content himself, as his predecessors Vice-Admirals Fourichon and Bouët-Willaumez had done, in blockading the Prussian ports, and falling on the merchant ships which attempted to put to sea or to approach their coasts after the first departure of the squadrons.

This feigned departure—for it is proper to call it so since Admiral Bouët, after having returned to Cherbourg on the 19th September last, only stayed

¹ Within which lies Wilhelmshavn.—TRANÆ.

there long enough to complete his ships—this feigned departure had been a very skilful manœuvre, but the Commander-in-Chief of the Prussian Fleet was not to be taken in by it. He continued under shelter at the bottom of the bay of the Jade, whilst the merchant navy, more bold, sent out from Bremen, Hamburg, and Lubeck a great many ships. At the same time the Prussian ships which were sheltering in British ports put to sea to gain the coast of Hanover, where they hoped to arrive safely and without difficulty.

This was not counting on the return of our frigates; and as on their approach the Prussian Maritime Authorities judged it prudent to again extinguish the lights, and to remove the buoys which had been replaced at the mouths of the Elbe and Weser, the German ships which were outside had no resource when they saw the French flag but to surrender or run ashore. Those who, more daring, attempted to get into the river or into the bays, ran upon the submarine mines which had been submerged for our benefit, and sunk under the eyes of those for whom the engineers of King William had reserved this sort of death. Thus, thanks to many circumstances, the losses suffered by the commercial marine of Prussia had been immense, especially during the last weeks. More than thirty ships certainly had been captured or lost, ships and cargoes, and it is not exaggerating to estimate the German losses by the blockade since the end of July at five millions of francs a day.

We can, then, easily understand the exasperation of the German trade against the French Navy. The great cities of the Weser and the Elbe, which had monopolized the transit between the east of Europe and America, suffered particularly, and thence sprang, no doubt with the design of raising in their favour the sympathy of the English merchants, the eagerness with which was spread the rumour of the approaching bombardment of Hamburg. This old free town knew in fact that France had a sound memory, that she remembered with what enthusiasm her Chamber of Commerce had spontaneously voted ten millions of subsidy for the war, and that if a favourable opportunity offered our fleets would be without pity for her. But for the moment she might be without fear; but God knows what the future may present for the Prussian littoral, and if the war continues the Hamburgers may be certain that they will not be forgotten, and that the interest on their ten millions will be paid to them with the same care as the liberated country will devote to all her accounts.

This explanation relative to the later operations of our squadrons having been made, I now retrace my steps to give a rapid history of this campaign in the North Sea and in the Baltic, from the day that the ironclad fleet left Cherbourg up to the time when the disaster of Sedan came to take away from Admiral Bouët-Willaumez the feeble initiative part which the formal orders of the Government had left to him, orders renewed, so to speak, in each of the rare telegrams which the then Minister of Marine, Admiral Rigault de Genouilly, addressed to the Commander-in-Chief of the Baltic Fleet.

This history is absolutely necessary, not only to set right in the interests of truth all that has been said and written so recklessly in regard to this expedition, but still more to prove that our Navy has never ceased for an instant to be at the head of that painful mission which it has been hers to fulfil.

Placed officially near Vice-Admiral Bouët in order to follow the naval operations, I am better able than anyone else to trace them out day by day, to judge of them from the point of view of a professional man, and to show that the squadron was always as much hindered in its movements by the instructions and the hesitations of superior authority, as by the political circumstances which were produced by the absence of frequent and certain news from the seat of war, and finally by the composition of the fleet in respect of the coast against which it had to operate. It is easy then to see

that the French Navy has seldom had a rougher or more ungracious task to fulfil, and that if the expedition was useless in a military sense, it can only be put down to those who had as ill understood the means proper to employ, as the end it was proposed to attain.

Vice-Admiral Bouët-Willaumez, a man of action and energy, found himself immediately reduced to forces at once imposing and insufficient, in spite of the promises that had been made to him, and his squadron, like the later one of Vice-Admiral Fourichon, found itself condemned throughout long weeks to an inaction that the Officers and ships' companies would have willingly changed for military operations. It required less courage in the fleet to fight than to support the fatigues, the dangers, the vexations, the privations of all kinds which were imposed on it, and for which the two valiant chiefs are now only recompensed by criticism, as false as malicious, which reflects on the whole Navy.

We proceed, then, to take the fleet from the moment of its departure, and to follow it in its principal movements and under the several Chiefs which have commanded it up to the 19th of this month, that is, up to the day when the Division of Rear-Admiral Penhoët returned to Cherbourg, while Vice-Admiral de Gueydon returned to Dunkirk towards the North Sea with his squadron.

SECOND ARTICLE (November 25th).

For several days after war had been declared, it was not known what General Officer would be placed at the head of the important expedition which was to be sent to the Baltic. It was said that Admiral Rigault de Genouilly, the Minister of Marine, wished to assume this command himself, and as a fact, the completion of the frigate "Océan," destined to become the flag-ship, was hastened.

Several days passed in this state of uncertainty, when, on the 22nd July, Vice-Admiral Count Bouët-Willaumez suddenly learnt that the Emperor had chosen him as Commander-in-Chief of the Baltic fleet. The Minister of Marine had declined the appointment; the obligation of giving up his seat in the Ministry having been rigorously imposed upon him in case of his accepting it. He informed Vice-Admiral Bouët-Willaumez that the fleet put under his orders would be composed of fourteen ironclads, a great number of small vessels, and other vessels proper for the expedition. A second fleet, under the command of La Roncière le Noury, and made up of heavy steam transports, of gunboats, and floating batteries, would follow after a short delay with 30,000 men for landing under the orders of General Bourbaki. On the morrow of his nomination, Vice-Admiral Bouët-Willaumez proceeded to Cherbourg and hoisted his flag on board the "Surveillante," an ironclad hardly completed, in spite of the zeal displayed by Vice-Admiral Roze, the Préfet Maritime. Nearly everything was wanting in Cherbourg Dockyard, neglected as it had been for several years by the Ministers of Marine, who had stripped it to the profit of Brest and Toulon, their birth-places or their choice. Not only were the armaments and stores insufficient in quantity, but there were not men enough—war having been declared at the moment when the seamen of the Inscription Maritime, that is to say, those immediately available, were nearly all at the fisheries on the banks of Newfoundland, and off the Coasts of Scotland.

Admiral Rigault was, moreover, not ignorant of these difficulties, for alone amongst Ministers he had the courage to declare openly in Council that he was not ready. We may at least do him this justice.

However, Vice-Admiral Bouët did not the less hasten his preparations for departure, although there was already no more talk of the fourteen ironclads and the numerous small vessels of which the squadron was to be composed.

The few moments that had elapsed since his nomination had sufficed to considerably modify the arrangements of the superior authority.

Did not the Minister of Marine desire to give to the fleet, commanded by another, the importance which it would have possessed under himself? Was it immediately perceived that more had been promised than the dockyards were able to furnish? Is it true that in face of Prince Napoleon's determination to command the landing force placed under the orders of General Bourbaki, and the impossibility of permitting it, this indispensable element of success in the Baltic Expedition had been given up? Finally, is it certain that this famous landing force was officially composed only of the 10,000 men of the Marine Infantry? As I understand it, we must say yes to each of these important questions; events have shown it too plainly.

Vice-Admiral Bouët-Willaumez throughout only believed in the delay of the projected armaments, and, forced into action, he determined to sail from Cherbourg with his squadron reduced to seven ironclads and a single cruiser.¹ It is true that he was formally promised that his fleet would be speedily reinforced by six other ironclads, five cruisers, the monitor "Rochambeau," and the ram "Taureau." The instructions from the Minister of Marine spoke only of the colossal northern fleet as if it had been complete and ready to assume the offensive. Thus, he wrote to his Commander-in-Chief under date 23rd July:—

"You will proceed first towards the Sound, whither you will detach the 'Thetis' to Copenhagen, then, by night, you will return to the Jade to blockade the Prussian squadron there. When the other ships are dispatched to you, you will leave one division before the Jade, under Rear-Admiral Dieudonné, and you will proceed with the other to the Baltic."

These instructions contained some information respecting the Prussian fleet commanded by Prince Adalbert, then they concluded with a formal order forbidding the attack on open towns.

All, in fact, seemed to have been foreseen—even the difficulty which might arise in finding pilots for the Baltic. A Captain, M. de Champeaux, had been sent to Denmark, and, thanks to his intelligence and zeal, the Danish pilots were ready to give their services to our squadrons; the signal stations on the coast of Jutland had received instructions which enabled them to communicate with us by means of cypher signals, and Kioje Bay, south of Copenhagen, on the east of the island of Zealand, was chosen as the base (*lieu de ravitaillement*). Moreover, the Admiral received as a reserve fund the sum of 200,000 fr.

Finally, as a last detail, most interesting when considered with these preliminary orders, Vice-Admiral Bouët-Willaumez was invited to keep an eye on Russia at Cronstadt, which proves that already there was mistrust as to an alliance between Berlin and St. Petersburg. This is so certain, that the Minister added, in a second despatch:—

"In view of eventualities with regard to Russia, orders have been given to the Mediterranean squadron to rendezvous at Brest, so as to sit astride (*rester à cheval*) of the Straits of Gibraltar and the North Sea."

It may be seen that on these Ministerial instructions the first point for the operations of Admiral Bouët was the Jade, where the Prussian squadron was said, though without certainty, to have sought refuge. The Commander-in-Chief hoped that it was untrue, and that Admiral Adalbert was at sea, where he might be overtaken and offered battle. In this expectation he settled, immediately before leaving Cherbourg, a plan of a ramming attack, with which he made each of his Captains acquainted.

¹ The word is always "aviso," but the author evidently uses it in a general rather than a technical sense.

Vice-Admiral Bouët-Willaumez knew that Prince Adalbert had under his orders three ironclads, one monitor, and that he had his flag in the "König Wilhelm," that is to say, in a ship superior in speed and gun-power to any ship in our squadron, and against whose plates most of our projectiles were powerless. The "König Wilhelm" was built in England; she is armed entirely with 24-cm. guns, and the "Rochambeau" was alone fit to engage her. But the "Rochambeau," on the 23rd July, though she had cost France twelve millions, was still incomplete. Our Engineers, in order to admit none of the qualities of the American monitor,¹ had discovered so many defects in her that for two years she had been carefully hidden from all eyes, under pretence that she was under repair. I must hasten to add that, whether she has been little altered, or whether there has been a complete transformation, the "Rochambeau" is now one of the most powerful engines of offence and defence which exists. I shall have occasion to speak of her again.

But, as I have just said, the Vice-Admiral could not count on her immediate support, and he had in consequence to adopt a plan of action which would paralyze the gun-power of the "König Wilhelm." In the ramming attack everything depends on the skill of the handling and the rapidity of the impulse. It was the ram of the "Surveillante" turned into a gigantic projectile which would give an account of the iron sides of the Prussian ship.

These arrangements being made, the squadron of Vice-Admiral Bouët-Willaumez left Cherbourg on the 24th July, at five o'clock in the evening, under the gaze of the whole population of the town, crowded on the jetties and on the terrace of the Casino, to bid good-bye and send across the water wishes for their success and happy return.

The dispatch vessel "Jérôme Napoléon" accompanied the fleet with the view of returning to Dunkirk with news either of the battle, if the Prussian squadron was met with, or immediately after arrival at Heligoland.

Heligoland, it is known, is an island facing the coast of Hanover, 20 or 25 miles from the mouths of the Weser and Elbe, and belonging to England. It was in this neighbourhood that the French squadron was first to operate, and it was to find in the Governor of this British possession, formerly Colonel of an English regiment in the Crimea, a gentleman ready to do all he could, consistently with his neutrality, to make himself useful and agreeable to his old companions in arms and in victories.

THIRD ARTICLE (November 26th).

Furnished with all these instructions, of which I have given a brief *résumé*, and once more assured by a last Ministerial dispatch with respect to the promptitude which would be used in forwarding the promised means of action, Vice-Admiral Bouët then was away from Cherbourg on the 24th July. His squadron comprised the "Surveillante," flag, the "Gauloise," flag of Rear-Admiral Dieudonné, the "Guienne," the "Flandre," the "Thétis," the "Jeanne d'Arc," and the dispatch-vessel "Cassard." The crews of most of these vessels had been completed by seamen so hastily embarked that there was not even time to furnish them with complete kits. But the guns were well manned, and as the Commander-in-Chief had but one design—to chase and bring to action the enemy's fleet—he did not with less confidence make his way at full speed to the north-east, to pass the Straits. On their departure from Cherbourg roads, the ironclads had been formed in order of battle, and everything was ready on board for clearing decks for action.

¹ The "Rochambeau" had been the "Dunderberg."—TRANS.

On the next day, the 25th, the "Galloper" light-vessel, on the English coast, signalled the passage of the French squadron, which enabled Prussia to learn that her enemy drew near, while the whole of France, thanks to the injunction which had been put on the newspapers, did not know that her fleet had sailed.

It was, doubtless, on this account, that Admiral Bouët failed to meet the Prussian Fleet, either during his passage to the north or on cruising on the coast of Hanover to reconnoitre the Jade roads. The pilots assured him that Admiral Adalbert had gone to the Baltic to take refuge at Kiel, but M. Kraetzer, the interpreter, rightly thought the other way, that the Prussian Government was unable to assemble the squadron at Kiel, at least while uncertain as to the attitude of Russia.

This early uncertainty, which lost our squadron precious time, was the more vexatious as Admiral Bouët was without the Danish charts which should have been supplied to him before his departure, and without which it was, so to speak, impossible for him to get within useful distance of coasts where the lights had all been extinguished.

He decided, therefore, to push on to the north, above all since he learnt from his Captains that most of his ships were not complete with coal, and that some were even short. It was, consequently, important to reach the dépôt which had been selected and organized by M. de Champeaux.

On the 28th of July, just when rounding the Skaw, the northern point of Denmark, the squadron met this superior Officer, who came to meet it in order to beg Admiral Bouët, in the name of the French Ministry, to enter the Baltic. Denmark was ready to rise, the German party, confined exclusively to the Court, would be obliged to accede, and it was certain that the landing of the first company would be the signal for action to the Danish people, anxious for revenge on their irreconcilable enemy.

At Copenhagen, since the declaration of war by France against Prussia, the women of the upper class, as well as those of the common people, wore only French colours; in the theatres they sang nothing but the Marseillaise and the German Rhine; a subscription for the French wounded reached the sum of 80,000 fr. in a few days, whilst the subscription for the German wounded only amounted in the same time to 1,800 fr. The enthusiasm was, in short, at its height; nearly the whole Danish press ardently preached war and vengeance. We had there, in fact, an ally fully ready, to whom it would be enough to extend a hand. And this ally, it must be remembered, in spite of the error we have committed, would, perhaps, have been enough to change the face of things. With her navy better acquainted than ours with these difficult waters, better prepared for the navigation of these dangerous narrows, landings became extremely easy, and as Denmark could place 40,000 men in the field, Prussia would have been threatened on the north with an army of 70,000 men, which would have forced her to keep more than 200,000 soldiers in Hanover and Holstein, without counting the garrisons of which it would not be possible to deprive the towns on her coast threatened by our ships.

But to gain this result, it was required before all things that our landing force should show itself. The mere presence of a squadron was not enough to provoke a popular movement, and, besides, with the orders which he had received to watch the Jade, Vice-Admiral Bouët-Willaumez could not yield to the desire of the French Ministry and enter the Baltic. He said this to M. Champeaux, and telegraphed at once to Paris for fresh instructions.

This dispatch had hardly gone when the Admiral received from Paris a telegram which remains certainly one of the most singular in this sad campaign.

After certain details in respect of the Service, the Minister of Marine

invited Vice-Admiral Bouët to choose a point of observation which would permit him at once to respect the neutrality of Denmark, to watch the enemy's coast, and to provide for the supply of his ships. He recommended him also, the entry to the Jade being open, to leave considerable forces there in observation.

Here were only recommendations, useless comings and goings without definite aim ! This post of observation, where could it be taken up ? In the North Sea, or in the Baltic ? But how to watch the coast of Hanover from the Baltic, and how from the North Sea to observe what went on on the Prussian coast ? Were such things possible with seven ships ? They forgot at Paris, that between the Jade and Kiel were nearly 900 miles, one part of the distance through straits which bad weather rendered impassable for heavy ships. It was enough to make one suppose that there were no French charts at the Ministry of Marine, as there were no Danish charts on board the ships of the squadron.

However, Vice-Admiral Bouët awaited the instructions which he had requested from Paris, and the silence of the Minister was not explained when, on the 1st August, M. de Cadore arrived in the "Coligny." This diplomatist, charged, as it was said, to negotiate with Denmark and the other smaller Powers of the North, which could only be brought about by the arrival of an expeditionary corps and a movement of the Danish populace, renewed the application to the Commander-in-Chief to proceed to the Sound. Admiral Bouët replied to him, as he had replied to the official M. de St. Feriol, that it was impossible. However, he agreed to wait another forty-eight hours for the reply of the Minister of Marine to his dispatch, but when that time should have elapsed, it was decided to return to the Jade, as he was directed by his instructions.

M. de Cadore had to content himself with this decision, and he returned to Copenhagen, where his overtures had been received but coldly by a Court so intimately connected with Prussia and Russia by its alliances.

It was in the midst of all this that Admiral Bouët learnt that a Prussian monitor, the "Arminius," was attempting to pass the Great Belt with the "Elizabeth." He sent at once, to meet these enemy's vessels, the "Thétis," the "Guienne," the "Jeanne d'Arc," and the "Cassard ;" and he was able to convince himself, by this first forward movement, that the French squadron was so constituted as to be unable to act with full advantage in waters open only to vessels of light draught.

The "Arminius" was able to shelter herself in a bay of Jutland before she could be reached, that is to say, in neutral waters, and the next day, thanks to a fog, she continued her voyage along the coast, where the French ships could not pursue her. She thus gained the North Sea and the Jade, without being again seen. As for the "Elizabeth," when her Commander knew, by means of the Prussian spies spread along the coast, that the enemy's ships were approaching, he returned rapidly to Kiel, which he did not again quit.

This is, in truth, the history, as to which there has been such an outcry, of the breaking of the blockade by a Prussian ship. The "Arminius" is a little monitor drawing not more than 8 or 10 feet of water and powerfully armed. The dispatch-vessel "Cassard" was the only one which could attempt to follow her in-shore, and the whole of her armament was but four 12-prs. and a pivot gun, whose projectiles were useless against the plated sides of the Prussian monitor. Meanwhile, this first failure showed the difficulty of chasing even merchant ships in these waters, where the neutral and the enemy's coasts are so near together as to offer a thousand places of refuge to the chase, and where the banks, reefs, and shoals necessitate minute and incessant precautions.

We shall soon see, in coming towards the Prussian littoral, that the French squadron had only met the smallest of the difficulties which it would have to conquer.

On the 2nd August, M. de Champeaux returned on board the "*Surveillante*," bringing to Vice-Admiral Bouët a dispatch from the Minister, which required him to enter the Baltic. Although this order was not a direct reply to his application for instructions, the Commander-in-Chief did not long hesitate, and he passed down the Cattégat in order to present himself and his ships at the entrance of the Great Belt.

The second phase of the French expedition, that is to say, the most wretched and the most dangerous, was about to begin.

FOURTH ARTICLE (November 27th).

As it is probable that, since the time when the German philosopher threw this gibe at us—"The French don't understand geography"—we have made some progress in this important science, I do not consider it necessary to describe at length, to the readers of the *Moniteur*, the part of the world in which the French squadron was to act, and I think that some general outlines will be sufficient to prevent their losing sight of it.

When the Skaw is passed and we descend the Cattégat, the interior sea which separates Denmark from Sweden, we are met by three passages opening into the Baltic: the Little Belt, to the west, formed by the coast of Jutland and the Island of Funen; the Great Belt, in the centre, between this Island of Funen and that of Zealand; and finally, to the eastward, the Sound, which separates the Island of Zealand from the Continent.

These three passages, running nearly north and south, lead directly on to the Prussian coast, but they are not all equally practicable for all ships. The Little Belt, above all, is only navigable for merchant ships of light draught, the two others alone are available for heavy ships. The Sound is more easy to pass than the Great Belt, the shoals are less numerous, and the shores offer good shelter; but ships to pass through must not draw more than 24 or 25 feet of water, otherwise they are compelled to use the Great Belt, which was the case with the French squadron, some of the ships of which, the "*Océan*" for instance, draw no less than 28 feet.

But the Great Belt is studded with nasty reefs, which only here and there permit a narrow passage open in all winds. It was the first time that a squadron composed of such heavy ships had attempted it. Thanks to the skill of the Danish pilots, and to the detailed precautions taken, Vice-Admiral Bouët-Willamez succeeded in passing the Great Belt without accident, but not without anxiety, for the "*Océan*" for a moment had only 19 inches under her bottom. This first success was satisfactory for the hydrography of these parts, for it allowed of the correction of some errors in the Danish charts which had at last arrived, but in which the soundings were shown to be incorrect in certain places.

This first difficulty being surmounted, the squadron appeared on the 7th August in Marstrál Bay, having passed before Kiel and Fehmern. Then pursuing its way in reconnoitring the coast against which it was to act, and noting the points most favourable for landing the troops promised and expected, the Admiral visited in succession Neustadt, Wismar, and Rostock, and having refitted at Kioje Bay, appeared before Swinemünde and Colberg.

The weather was then fine, and made the progress easy, although the absence of the shore lights compelled the squadron to stand off during the night. But things soon changed, and the elements, as well as the circumstances, rapidly turned against us.

Under the supposition, in which he remained, that Denmark might at any

moment abandon her neutrality, Admiral Bouët-Willaumez studied during the following days the position of Also.¹ It was a point easy to take possession of, and from whence the landed force might operate usefully against Alsen, that is to say, on the coast of Sleswig. Also was admirably situated for becoming a new Kamiesh; its bay is landlocked, and although studded with reefs, it is possible in buoying it with care to make it a good war port, sheltered from all the naval forces of Prussia.

This plan resolved upon, Vice-Admiral Bouët hastened to communicate it to the Minister of Marine, but his letter had hardly gone when he received the following communication, dated 7th August :—

“Monsieur le Vice-Amiral,

“Serious events have occurred on our frontiers. The Army has suffered reverses, and it is the duty of the fleet to seize with still greater energy the opportunities which may offer of injuring the enemy.

“Whilst Rear-Admiral Penhoët remains at Cherbourg with his division, Vice-Admiral Fourichon proceeds to-day for the Jade with a second squadron.

“I still recommend to you the most absolute respect for open towns, for, *apart from unforeseen operations*, it is in a strict blockade of German commercial ports that the chief means of action by the squadron will be found.

“I need not say that the country relies with confidence on the devotion and patriotism of the fleet.”

A strange letter, if ever there was one, and in which I have underlined certain words, for they seem to show that there was no longer any question of a landing force. So, the Minister of Marine gives notice of our reverses to the Commander of the Fleet, recommends him to act vigorously, reports a new fleet for the North Sea, that is to say, a second Commander-in-Chief, forbids again the least action against open towns, and speaks neither of the expeditionary corps nor of the vessels proper to facilitate blockade and to attack the strong places.

I have no wish to speak of the painful effect produced on board by the news of these early reverses, which the Prussian dispatches soon confirmed and even exaggerated. In this little space which we call a ship, where we jostle one another at each step, where one has not the refuge of isolation and resting alone with one's thoughts, and where nothing from outside comes to distract the anxieties which overwhelm, and the uncertainty which gnaws, sensations are stronger and griefs more profound than elsewhere. The squadron passed through all these agonies, which were shortly to be accompanied by the struggle without truce against the elements, and against insurmountable difficulties.

However, after receiving this sad news, Vice-Admiral Bouët was not discouraged, but hastened, on the contrary, to retrace his path on the Prussian coast, and proceeded to examine Kiel to assure himself that the port did not shelter any war ships.

He soon learnt that the only ships there were the “Elizabeth” and some gunboats. Another vessel, the “Renold” was anchored before Fredericksort, ready to be sunk across the passage already so well defended by three wooden stockades, several lines of submarine mines, and obstructions formed of fishing nets, all this at such a distance from the military port of Kiel, that even were the French ships close up to these impassable obstacles, their guns would still have been unable to reach the town.

It is known that Kiel is at the end of a narrow arm of the sea, and that

¹ Als Fiord (?).—TRANS.

before arriving there, supposing the passage free, we must pass under the plunging fire of forts raised 30 yards above the shore.

A Prussian steam pinnace, which was watching at the entrance of the bay, hastened to re-enter on sight of the French ships, and we judged, on following her with our eyes, that the passage left open in the channel was hardly sufficient for the smallest vessels. A squadron commanded like the French squadron, by skilful and resolute men, and manned like it, by intrepid crews, might well attempt to force the mine-fields, and face the heaviest batteries. One part of the force would then be sacrificed to open the passage to that which followed. But there are obstacles against which courage and the most irresistible energy are useless, and it may be easily conceived, in studying the question from a practical point of view, that if the writers who arrange at their firesides a system of fancy naval tactics, make it out as extraordinary that the French squadron did not force the entrance of Kiel—it may be conceived, I say, that Admiral Bouët-Willaumez may have hesitated to throw his ships upon reefs and shoals where they would be uselessly lost. He should have had, to act against Kiel and other important places on the coast, gunboats, floating batteries, and landing forces to occupy the points reduced. But we know that he was without any of these means of action.

In quitting Kiel, the squadron continued to follow the line of coast, rounded the Island of Fehmern, and passed into the Bay of Neustadt, which, of all this part of the littoral, is far the most favourable for landing an army which has Hanover for its objective.

Having finished this examination, Vice-Admiral Bouët-Willaumez was proceeding on his route to the eastward to make the island of Rugen, when he was rejoined by the “Coligny,” whose Commander gave him two dispatches from Paris. The one, dated August 6th, told him to return to France immediately with his fleet, the other, dated the following day, ordered him to remain where he was.

Tired of the contradictions and hesitations which paralyzed him, the Commander-in-Chief of the squadron returned to Kioje Bay, where, determined on action, he addressed to his Flag-Captain, Captain Grivel, an order to assemble a Committee with the object of studying for itself, and clear of all outside inspiration, the points on the coast that might be attacked. Admiral Bouët did not wish to rely solely on his own judgment, he wished to have the advice of all.

This Committee was immediately formed. It was composed of Rear-Admiral Dieudonné, President; M. Duburquois, Chief of the Staff; Lacour, Colonel of Artillery; and two Captains chosen by lot, Captains Quilio and Serres, commanding the “Guyenne” and the “Thétis.”

On the 12th August they met on board the “Surveillante,” and the same evening their report was complete.

The following are the terms in which they expressed themselves with regard to the most important places on the Prussian littoral, and the military operations which might be undertaken.

FIFTH ARTICLE (November 28th).

It must not be forgotten, in reading this report, that it was made at a date anterior to the catastrophe of Sedan, by experienced men, outside of all political influences, of Officers whom the whole Navy justly placed amongst the most capable and energetic of its members.

In order not to uselessly lengthen the story, I will only quote the most prominent parts of it.

Alsen.—The depth of water will not permit an approach to this point

within at most 3,000 mètres, a distance at which an engagement would be useless, because of the plunging fire of the forts. Nothing is here possible without a force to land. Besides, it is most probable that submarine mine defence extends along the shore, which it would be indispensable to remove, and which could not be attempted until the squadron was supplied with the necessary materials.

Duppel and Kappeln.—Completely out of reach from the ships' guns. Too little water in the bays. We could only get at them with armoured gunboats.

Eckernford.—It is easy to destroy the isolated batteries, but they are of no importance, and without the possibility of throwing troops on shore, the reduction of the forts would be insignificant.

Kiel.—It would be necessary to employ the whole force of the squadron. The success of gun-fire uncertain on account of the height of the forts above the shore, and the losses certain for the assailants, if they were not able to occupy the forts as they were silenced. The forts of Frederiksort being destroyed, and the squadron being unable to penetrate to the bottom of the bay within gunshot range of Kiel, on account of the obstructions, the torpedoes, and all the means of defence which have there been accumulated, the French ships would soon be forced to retire without even knowing the result of their attack.

Neustadt.—An open town and without defence, but with a bay so shallow that the French ships could not even reach with their projectiles the merchant ships which are anchored some distance from the port, properly so called.

It is the same all along the coast as far as—

Colberg.—A strong place, besieged in 1807, and attackable (from the sea) at 2,200 mètres. Before entering upon action there, it will be necessary to make a reconnaissance, in order to make certain that the houses along the shore, the Casino in particular, do not mask fortifications which would compel a modification in the plan of attack.

Danzig.—The fort at the entrance to the bay is within range of our upper-deck guns, but only at a distance of 4,000 mètres. The battery guns could not be used elsewhere with advantage.

Conclusion.—Colberg and Danzig alone can be attacked; but the small effect which will result from these two attempts will be of a nature to deprive the French squadron of the prestige of its force. In order to operate usefully special vessels are required, and the prospect of forcing the enemy to assemble his troops on this part of the littoral. But this end is unattainable without a landing force.

This paper, signed by the members of the Committee, was read on the 13th August to all the Captains of the squadron, and did not provoke a single observation, in spite of the prior request of the Vice-Admiral to all his senior Officers to study the question, and to settle, each one for himself, what could be usefully attempted. In a word, the adhesion was general.

It must be remarked that in the report there was no question of Hamburg, or of Lubeck, of Bremen, or of Stettin, nor in fact of any of the ports of which the destruction seemed so easy to the critics who, being on shore, occupied themselves with the affairs of the squadron. It was because these towns (these fantastic sailors did not know it, and no doubt ignored it) are at the ends of shallow rivers, 12 or 15 miles from the coast, where even in peace-time and with the most skilled pilots, the Prussian ironclads do not enter themselves. To ask for their bombardment by the Baltic Squadron would bring us back to the fear that the English line of battle ships would some day shell Rouen or Bordeaux.

There remained, then, Colberg, and Vice-Admiral Bouët prepared to

make some serious demonstration against this town, when he received, on the night of the 13th August, a dispatch which informed him that the Prussian fleet had left the Jade, and had passed up the coast of Jutland to enter the Baltic.

The fact might be true, for it was possible that Prince Adalbert might have learnt the departure of Admiral Fourichon from Cherbourg, and had left the Jade to seek the shelter of Kiel, which he thought might be attacked.

In face of this contingency the Commander-in-Chief of the squadron did not hesitate an instant; he hastily drew his ships together, and proceeded towards the Great Belt to oppose the passage of the enemy's vessels and to offer them battle.

The cruise along the Prussian coast was then interrupted for some days; but the time was not lost, for the Admiral utilized it to proclaim the blockade of the enemy's ports, and a copy of the notification was sent to the French Minister at Copenhagen for insertion in the official Danish newspapers.

However, the Prussian fleet had not left the Jade; it was, on the contrary, closely blockaded by Admiral Fourichon, who had arrived there with seven ironclads, the cruise of which, to be presently returned to, was to be still more unsatisfactory than that of the squadron in the Baltic.

As soon as it was certain that there was nothing to fear from the northern side, Admiral Bouët passed to the southward, and arranged his squadron in two divisions, to endeavour, with the feeble means at his disposal, to make the blockade as effective as possible. On the 16th of August he advised the Minister that Rear-Admiral Dieudonné blockaded from Kiel to Arkona with his division, and that he himself watched the coast from Stettin to Memel.

But it must be observed that, having only heavy ships under his orders, the smaller Prussian vessels could always find refuge along the coasts, and that the blockade would soon have an effect more moral than real, the shore to be guarded being more than 300 miles in length.

It was in the midst of all this that the dispatch vessel "Jérôme Napoléon" had an affair with a Prussian dispatch-vessel, the "Royal Eagle," which she would have captured if she had only had a bow gun. But the "Royal Eagle" is a very fast steamer, and before the "Hermite" and the "Thétis," sent off in chase, were able to cut her off, she succeeded in taking refuge in the bay to the east of Hiddensee, where two of the enemy's gunboats, anchored on the shoals, protected her retreat.

This chase resulted in the discovery of a perfect nest of gunboats in Witte Bay, where the "Jeanne d'Arc" was ordered to remain on watch, and proved once more that, deprived of light ships of high speed, and with small draft of water, the squadron would wear itself out to no purpose. Its Commander-in-Chief telegraphed the fact to Paris with the greater pertinacity as he was informed of the armament at Kiel and Danzig of two more fast dispatch-vessels.

It is now easy, after this explanation, to understand the difficult position of the squadron, which the season was about soon to render more perilous.

Thus, at the date of August 23rd, Admiral Bouët was blockading the five more important ports of the littoral, Kiel and Lubeck, by the Bay of Neustadt, Stettin, Stralsund, and Rugen, and there only remained to cruise at sea two ships, including the "Surveillante."

But, during the replenishment of one of the cruisers, a guard was required, for in the roads where she went to take in her coal, at Langeland in the Great Belt, or at Kioje Bay in the Sound, she was often visited by the fast dispatch-vessels of the enemy; the "Grille," for instance, which suddenly turned up in the night under the land, fired on the anchored ship, tried to pass torpedoes under her bottom, and fled, so that it was impossible to pursue her.

The fatal consequence of this state of things was the delay in replenishment ; each ship could only go to work when protected by a guarding vessel.

None of these facts were unknown to the Superior Authority, to whom the Vice-Admiral sent letter after letter, but the days passed without any amelioration in the circumstances of the squadron. The Danish pilots themselves were afraid, for the weather was rapidly becoming worse, gales succeeded gales on coasts without lights, without bays completely sheltered, and strewed with reefs and shoals. It was, moreover, likely that Denmark, under pressure from Prussia, aided by our want of military success, would be obliged to restrict still more our means of replenishing the ships, and thus make the campaign impossible. As for prizes, there were none ; most of the large merchant ships had been at an early date converted into Russians or Swedes, and the smaller ones could, after slipping along their coasts, get into neutral waters and proceed free from all pursuit.

Vice-Admiral Bouët explained all this to the Minister of Marine, without bitterness, without complaint, but only in the hope of making him understand better what the squadron could and what it could not do, made up as it was. And he proved the real danger to which it was exposed when thus constituted, by bringing before his eyes the report of the attack, of which he was the object, at Danzig, during the night of the 30th August.

Admiral Bouët determined to examine Danzig Roads closely, pushed in there in spite of the mine-fields which defended it, and he had the daring to anchor there, having, however, taken all the precautions necessary in such a case. Not only were the men at their quarters, but, besides, a steam pinnace continually steamed round the anchorage occupied by the ships. Towards half-past one in the morning, a small gunboat of the enemy approached by hugging the land, but the moment she made for the "Surveillante" she was seen by the steam pinnace, on which she opened fire with grape. The pinnace replied with rifles, and the "Thétis," which had the guard, got under way in three minutes by slipping her cable, and chased the Prussian vessel to the entrance of the harbour of Danzig, where she was able to take refuge without much damage.

For the second time the want of small vessels of high speed allowed an important prize to escape, and one understands the discouragement which at this time seized upon the Officers and ships' companies, who began to cease to hope, as compensation for their efforts and their fatigues, for any of those brilliant and decisive affairs so ardently desired by their patriotism. They received from France only the intelligence of new disasters, and they were fatally condemned to relative inaction which humiliated them, and from which they demanded to be released at all risks, in order to get at the enemy.

SIXTH ARTICLE (November 29th).

While Vice-Admiral Bouët, as we have seen, endeavoured to make the best he possibly could out of the difficult situation which so many diverse circumstances had created in the Baltic, Vice-Admiral Fourichon arrived in the North Sea to undertake a cruise, perhaps still more unsatisfactory.

It is, in point of fact, enough to cast one's eyes over a chart, even the most imperfect, of these waters, to recognize the difficulties which a blockade offered to an ironclad squadron. At the bottom of the sort of funnel in which the French ships had to operate, the Elbe and the Weser debouch, and also the bay of the Jade, which had to be closely watched night and day in all weathers. Along these shores, without shelter, and completely in the hands of the enemy, Admiral Fourichon could not dream of a place to replenish in. The English island of Heligoland, which, moreover, could not offer a refuge in case of accident, was closed to him, and it was entirely in the open sea that

he had to fill up with coal and provisions. If it be added that the gales of wind in these parts blew oftenest from S.W. to N.E., it can easily be understood what sort of a business this cruize was on a coast so constantly beaten by wind and sea that the people who are its masters have not in several centuries succeeded in opening a port of refuge. They have been obliged to content themselves with what Nature has offered them behind the banks at the mouths of their rivers. In a word, it is the most inhospitable shore of all, where a French ironclad during a gale, suffering serious damage to her engines or masts, is bound to perish, body and bones.

It was here Vice-Admiral Fourichon arrived on the 9th August, with the "Magnanime," the "Provence," the "Héroïne," the "Couronne," the "Atalante," the "Invincible," the "Valeureuse," the "Revanche," and four small vessels, the "Decrés," the "Cosmao," the "Château-Renaud," and the "Renard."

Without losing a moment he ran along the coast, learnt that the Prussian squadron was at the bottom of the Jade, and divided his squadron into two divisions, under the orders of Vice-Admirals Devoux and Jauréguiberry. These Officers were to watch, one the mouths of the Elbe, and the other the mouths of the Weser, whilst he himself never took his eyes off the enemy's fleet, to which he over and over again offered battle, but always without result.

Ten or twelve days thus passed in observation, when one morning the whole fleet collected off shore had a moment's hope. A dispatch-vessel ran out of the Bay of Jade, and made for the anchorage. It was soon seen that she bore a flag of truce, and also that of a Rear-Admiral. This was a vessel carrying the Prince of Hesse, who made upon Admiral Fourichon this singular attempt at intimidation which has been related in so many different ways. On the request of the enemy's vessel to communicate, the Commander-in-Chief replied by the order to stop abreast of the "Magnanime," and he sent the Chief of his Staff, Baron Roussin, and one of his Aides-de-camp, M. Arago, to her.

These gentlemen were received on board the Prussian vessel by the Commander, who informed them that the Prince of Hesse, the son of the Admiral commanding in the Jade, wished to have an audience with Vice-Admiral Fourichon. He had to give to him, he said, an important communication (*plii*) from the General Vogél de Falkenstein.

The Prince of Hesse, who was on deck, came over to the French Officers, and after declaring falsely that he did not understand our language, in order to get at what M. Roussin and M. Arago said between themselves, it was resolved to speak English.

Baron Roussin replied to the demand of the Prince of Hesse that he had full powers from the Commander-in-Chief of the squadron. The Prussian envoy insisted on not parting with his dispatches, but on carrying them himself on board the "Magnanime," but the French Officers held firm, refusing energetically permission to the Prince of Hesse to go on board the flag-ship, and a decision was come to to hand to M. Roussin this famous communication of the Prussian General.

But the letter of General Falkenstein was in German, and as the interpreter to the squadron was then on a cruize in the "Héroïne" observing the mouth of the Elbe, M. Roussin demanded that it should be translated into English.

The Commandant of the Prussian vessel set to work on this translation, and during this time the Prince of Hesse told the Chief of the Staff of Admiral Fourichon that General Falkenstein was writing to the Commander of the French Fleet to invite him not to attack private property at sea. The Prince added, as he was certainly ordered to do, that the squadron ought not

to be ignorant of the victories of the Prussian Armies in France, and that it was the interest of its Chief to agree to the demand of General Falkenstein, for a refusal could not but prompt reprisals, and increase the war indemnity. M. Roussin replied proudly that "The blockade and the capture of merchant ships are authorized by the Treaty of 1856, which Prussia had signed."

When the letter of General Falkenstein was written in English, the French Officers took it on board the "Magnanime," and whilst Admiral Fourichon was perusing it, the Prince of Hesse and the Officers accompanying him had the imprudence to profit by their stay in the middle of the squadron to make a plan of the anchorage, and to count the guns of the ships.

This was, on the part of the Prince of Hesse, a gratuitous want of respect for his flag of truce; for the French Fleet changed its position several times a day, and all the ships were not present: but this once more shows that, thanks to the system of espionage invented by M. de Bismarck, military honour is not in Prussia what it is amongst ourselves, and that everything is lawful for the servants of King William.

Admiral Fourichon's reply was not delayed. It was naturally a firm refusal, and an order to the Prussian dispatch-vessel to depart immediately. Her Commander took it for granted, and soon proceeded, but instead of making direct for the Jade, he pretended to have made a mistake in order to be able to pass near those of our ironclads. The Commander-in-Chief of our fleet might well have punished such a shameful proceeding; he preferred to abstain, and it is for history to judge severely the men who have only responded to our loyalty by ruses unworthy of their name.

The days which followed this incident were employed by the squadron in securing the blockade, and in pursuing without cessation the merchant ships which attempted to get into the Elbe and the Weser by night. Not a single one escaped; this was the categorical reply of Admiral Fourichon to the insolent step of the Prince of Hesse.

Soon, unfortunately, the weather became bad, gales succeeded gales, and the replenishment of the ironclads, which could only be done by boats in the open sea, became more difficult. The heavy ships of the fleet continued to struggle vigorously against the elements, but the colliers and store-ships not only failed to arrive with the same regularity, but they often remained knocking about at sea before being able to join the squadron, and the loss of a certain number of them was fatal. Moreover, the season was advancing, the equinoctial hurricanes were imminent, and the French ironclads would soon find themselves without coal in the most critical position.

Admiral Fourichon maintained his station not less bravely until the 12th September; but at this date, in the absence of news from France, and on the point of running short of coal, he decided to return to Cherbourg, where he was rejoined by the yacht "Hirondelle," which had already been several days in search of him.

The Commander of this dispatch-vessel brought him his dispatches, informed him of the collapse of the Imperial Government, the proclamation of the Republic, and his nomination as Minister of Marine.

Leaving then his squadron under the command of the Rear-Admirals until he should be able to send it fresh orders, Admiral Fourichon set out in haste for Paris, after having informed Vice-Admiral Bouët that he had quitted the North Sea, and that it might happen that the Prussian Fleet might take advantage of it to come out of the Jade, and throw itself into the Baltic.

SEVENTH ARTICLE (November 30th).

If we now go back some days to rejoin Vice-Admiral Bouët-Willaumez in the Baltic, we shall find his squadron reinforced by the "Rochambeau" and the

"Armide," but weakened by the departure of the "Océan" and the "Flandre." The too great draught of water of the "Océan" often left her useless, and the "Flandre" had damaged her machinery so much that it could only be repaired in France.

The "Armide" is simply an ironclad, and the "Rochambeau" is the famous American monitor, the ex- "Dunderberg," which France had swept away from Prussia by means of certain millions when she was put up for sale at New York. Of lighter draft than the ironclads, furnished with powerful artillery composed exclusively of guns of 24 and 27 centimètres calibre, throwing projectiles of more than 400 pounds a distance of more than 5 miles, with a mean speed of 13 to 14 knots, the "Rochambeau" was certainly a precious auxiliary; but we have seen that, unfortunately, she arrived too late. If Admiral Bouët had had her under his orders when he presented himself before Colberg, he perhaps could not have resisted the desire to make a serious demonstration against that town.

As I have said above, Colberg is, on the whole coast of Prussia, the single point open to attack, and the Commander-in-Chief of the squadron, to satisfy the impatience of his crews, was decided some day to appear before the town to bombard it; but he found himself face to face with one of those obstacles which it is repugnant to a French Officer to pass by.

Colberg is, at the same time that it is a strong place, a watering place, the Trouville of Northern Germany; and when the "Surveillante" appeared, 2 miles off shore with two other ironclads only—for Admiral Bouët did not wish to employ all the force at his disposal—he saw the parades and the terrace of the Casino thronged with women, children, old men, and invalids; while above the principal buildings in the town floated the Red Cross of the Geneva Convention.

To deal death into the middle of this defenceless crowd was not a business agreeable to the seamen of the squadron; and Admiral Bouët had only to consult the Officers to learn that everyone about him was of his way of thinking, and cared little for the sad sort of glory which would attend such an affair. Some minutes later the "Surveillante" turned her head round, and Admiral Bouët drew off, giving M. de Bismarck a lesson in humanity and true courage, which he only repaid by censure and calumny.

A few days later the Commander-in-Chief of the fleet received a dispatch, which has always been inexplicable, and might well be one of those ruses of which the Chancellor of the Northern Confederation makes such willing use. A telegram reached Admiral Bouët ordering him to bombard the open towns on the Prussian coast, and to act with the greatest energy. However, this dispatch was drawn in such ambiguous terms that the Commander-in-Chief demanded its confirmation. To his surprise the Minister did not reply.

Had Admiral Rigault de Genouilly altered his decision, or was he not the author of the dispatch? To these questions it is impossible to reply decisively. But it is permissible to suppose that, the Prussian armies being then in Lorraine, M. de Bismarck would not have been much put out had the squadron bombarded the coast a little—he knew it would not do much harm—in order to justify the excesses of the soldiers in our defenceless towns.

Whatever it was, we cannot sufficiently praise Vice-Admiral Bouët for not making this mistake, or for not falling into this trap, for it would not have failed to leave upon him and on the whole Navy, already so contemned, the responsibility for the Prussian reprisals.

This defamation, cast by certain newspapers which demanded persistently what the squadron was doing, in place of asking what was possible for it to do, was not long without bearing fruit. On the 26th August, Admiral Bouët received a letter in which the Minister appeared to complain, and to say that his orders were not executed.

What orders? We know the instructions given to the Commander of the squadron, and know also, I hope, the insurmountable difficulties which met him in the face.

Justly indignant to see that the Superior Authority blamed him for the relative inaction to which he was condemned, Vice-Admiral Bouët lost no time in writing to the Minister to put before him all that I have put before my readers; then he concluded by saying:—

“You tell me that the squadron first called that of the North is now to be called the Baltic Squadron. I have placed the matter in an order of the day, making to myself this reflection, that if the *rôle* of this squadron under its first denomination appeared to me at one time rather like that of the fleet in the Black Sea, it appears to me under its second designation singularly diminished by the defeats of our armies, defeats which have broken our hearts, and of which we suffer the consequences. Is it not to be feared, in fact, that there is reason to think we have been asked to do that which was beyond our power, since the immense means of action formerly arranged have been withheld from us? In other words, M. le Ministre, is not our *rôle* now as unsatisfactory (*ingrat*) as it appeared to us to be brilliant at the beginning of hostilities?”

It was impossible to answer in a tone more dignified and firm to such unmerited reproaches, or to write more faithfully in a few lines the history of this unhappy campaign so full of promise.

The days that followed the dispatch of this letter passed, for the Admiral, in a struggle against incessant gales of wind, and only on returning to the anchorage of Langeland, on the 5th September, he learnt the catastrophe of Sedan, and the grave events of which Paris was the theatre.

He then sent orders to all his Captains to rendezvous at the entrance to the Great Belt, so as to await the new orders which might be addressed to him, and to be ready to act upon them. It was there that he received orders to continue the blockade, and to make every endeavour to injure the enemy; naturally the thought of bombarding Colberg again occurred to him. The season was advanced, the Casino of this town would be a desert, and nothing any longer forbade this demonstration, which could not be of great importance from the military point of view, but which would at least be an encounter to record.

This determination taken, it was the skies which this time appeared to place themselves on the side of our enemies, for during five days the wind blew in a tempest so violent, that the squadron could not quit the anchorage.

EIGHTH AND LAST ARTICLE (December 1st).

On the 13th (September) finally, the weather improved a little, the whole fleet passed to the southward, and while Rear-Admiral Dieudonné restored the blockade of Kiel, Neustadt, and Lubeck with his division, Vice-Admiral Bouët made his way to the eastward to execute his project against Colberg. Before arriving there, he anchored in sight of Arkona,¹ and every preparation was made on board for the fight of the morrow, when, during the night, the squadron was assailed by a gale of wind from the N.W., so violent that several of the ships might have been lost.

The “Thétis” parted her cables, and the “Rochambeau,” caught by the wind on her iron-bound side, struggled for more than four hours against wind and waves before she was able to get out to sea. The unfortunate monitor, so completely steady when steaming head to sea, was almost in the trough, and

¹ Arkona is about 80 miles from Colberg.—TRANS.

rolled 30 to 34 degrees, which disquieted those who followed her with their eyes without the power of coming to her help. If the least accident had at this moment happened to her engines, she would infallibly have been lost body and bones, for her masts, very insufficient in ordinary times, were completely useless in the dangerous situation in which she found herself.

The engines held on well, happily, and the "*Rochambeau*" joined the squadron, which steered for Kioje Bay; Colberg once more was saved, for hardly had they reached the anchorage, when Vice-Admiral Bouët was informed that the North Sea Squadron had returned to Cherbourg, that the blockade of the Jade was raised, and that very probably the Prussian Fleet would take advantage of it to pass into the Baltic, with the view of taking him by surprise.

He immediately gave orders to defend the passage of the Great Belt against the enemy, and, to his great astonishment, at the moment when he was about to go himself to Langeland with the "*Surveillante*," he received, at Copenhagen, orders to bring the whole fleet to Cherbourg, passing by the Jade if his coal permitted it. He was told at the same time that M. Thiers was about to arrive in the "*Solferino*," and that he was to escort him into Russian waters before returning to France; but this order was countermanded almost immediately by a new dispatch, and Admiral Bouët hastened to fill up with provisions and coal in order to execute the last orders which he had received.

Two days later, in spite of bad weather, the whole fleet repassed the Great Belt without accident, and steered to the northward, while the news of his departure spread at Copenhagen, and caused there the saddest stupor. The Danes had hoped up to the last moment that our reverses would come to a conclusion, and that the Government would decide to send into the Baltic the landing force so desired. But, on the contrary, it was the squadron which disappeared, carrying with it the last hope of those friends so devoted that they asked themselves, on seeing the French flag disappear, if in their turn they would not soon have to answer, under the despotism of Prussia, for the sympathy they had displayed towards us.

Three days later Admiral Bouët was off the Jade, and stayed there all day, offering battle to the Prussian fleet, and endeavouring, but uselessly, to bring them out.

On the 29th, at noon, the "*Surveillante*" re-entered Cherbourg with the whole of the squadron, of which most of the ironclads had not extinguished their fires for sixty-six days.

The second phase of the campaign in the north and in the Baltic was finished, and the third had commenced some days. The Minister of Marine, in fact, while ordering Vice-Admiral Bouët-Willaumez to leave the Baltic, had given to Vice-Admiral de Gueydon the command of the northern fleet, and while the first of these squadrons presented itself before the Jade and vainly offered battle to the enemy, the second, under shelter at Dunkirk, prepared to proceed in its turn to the Prussian coast.

In spite of the advanced season, the navigation into the enemy's ports could not be left free for a single instant, and as replenishment had become impossible in the open sea, Admiral Fourichon had wisely decided that the station should be worked by two squadrons, which would replace one another in turn in the North Sea, and replenish at Dunkirk. Only, knowing the little shelter offered in the road of this town, and the dangers of its navigation, Admiral Fourichon had authorized the chiefs of the squadron to act according to circumstances, and to return to Cherbourg if they judged it necessary.

Vice-Admiral Bouët, in view of these essentially practical dispositions, had not much time to pass at Cherbourg; and on the 10th October he departed

again to relieve the squadron of Admiral de Gueydon, on the coast of Hanover ; but in making for Dunkirk he fell ill, and was obliged to ask leave to land. Rear-Admiral Penhoët took command in the "Savoie," and from this day forth the two squadrons alternately took their station, so dangerous at this season that on the 19th November—this month—the "Surveillante" returned to Cherbourg, towed by the "Revanche," without her rudder, and after having been forty-eight hours in extreme peril in the North Sea. And yet there are writers who dare to ask what the Navy does ?

It is easy to reply to them. One part of its Officers and seamen face the dangers of the sea to watch the Prussian coast, and to defend our commercial ports ; the other part, faithful to the traditions of the Navy under the First Empire, which, coming to the support of our exhausted armies, distinguished themselves at Bautzen and Leipsic—the other part was already at Strasbourg, and finds itself now at Paris, on the walls and in the forts, in the Army of the North, and in that of the Loire, wherever there is danger ; everywhere in fact where there is work for courage, honour, and devotion to accomplish.

ITALIAN COAST-DEFENCE ORDNANCE.

CHANGES FROM 1885 TO 1888.

(From *Rivista di Artiglieria e Genio*, of December, 1888. Translation by
A. ROBERTS, Esq.)

Information on Studies and Experiments.

Coast Matériel.

THE principal innovations introduced in our coast matériel from 1885 to the present year, 1888, will be found briefly summarized in the present chapter, which, after referring to the more important studies and experiments carried out, and to the modifications and adoptions introduced, gives the actual condition of our coast matériel.

At the end of the chapter will be found a short *résumé* of the studies and experiments in regard to this matériel which are still being pursued.

45, 32, and 24-centimetre Guns, Carriages (17·72, 12·64, and 9·45-inch), and Platforms; 24-cm. (9·45-inch) Howitzer, Carriage, and Platform.—No modifications worth mentioning have been introduced as regards the 45, 32, and 24-cm. guns, carriages, or platforms, nor in the 24-cm. howitzer, either as regards carriage, platform, or other gear; what modifications there were being limited to the removal of such slight defects of construction as were counselled by the long and extensive practical experience gained at the Naval Gunnery Schools.

40-cm. A.R.C. Gun, B.L. (15¾-inch Hooped and Rifled B.L. Steel Gun).—The limited power of the 32 and 24-cm. guns against the armour of ships of modern construction led to the purchase from Krupp of four 40-cm. steel guns intended for the defence of the fortress of Spezia.

These guns, which were at first intended to be placed in couples within two revolving turrets, were subsequently disposed of differently.

Two of them will be installed in a revolving iron turret faced with chilled cast-iron plates (Grüison), the mechanism and substructure of which will be furnished by Armstrong.

One of these proof plates satisfies the requisite amount of resistance to the impact of 43-cm. (17-inch) tempered steel projectiles, which strike it with an energy of 48,436 foot-tons.

The other two guns will be placed on two floating pontoons, which are also to be constructed by the Armstrong firm.

The ammunition for these guns consists of tempered steel shot, supplied by Krupp's firm, and of chilled cast-iron shot from the Genoa foundry.

These steel or cast-iron projectiles, when empty, weigh 910 kilog. (2,006 lbs.), and have a bursting charge of 10½ kilog. (23 lbs. 2½ ozs.) of fine powder.

These projectiles will be fired with brown prismatic powder, supplied from the Fossano powder mills; this powder, during repeated trials carried out at the Muggiano practising grounds with the 43-cm. naval gun, has proved itself able to compare advantageously with the best prismatic powders of Düneberg, Cologne, or of Rübeland; the results obtained from a charge of 375 kilog. (826¾ lbs.), firing a projectile of 908 kilog. (2,028 lbs.), being equal

to an initial velocity of 565 metres (1,854 feet), with a mean pressure (crushers) of less than 1,900 atmospheres ($12\frac{1}{2}$ tons).

The charge, divided into six cartridges, will be about 340 kilog. ($749\frac{1}{2}$ lbs.), the posterior cartridge in order to facilitate ignition will have its centre made up of grains of black prismatic powder with a hole through the centre.

16-cm. G.R.C. Gun (6.29-inch Hooped and Rifled Iron Gun).—In consequence of the absolute want of power of the 16-cm. G.R.C. gun as a coast gun, it was determined to remove these guns entirely from the armament of fortresses and to utilize them for conversion into 21-cm. B.L. G.R.C. howitzers.

Matériel for 28-cm. (11-inch) Howitzers.—The essential innovations introduced in the matériel for 28-cm. howitzers issued and in construction are two, viz. :—

1. Reduction of the gun-carriage so as to allow fire up to 75° elevation.

2. Abolition of the platform elevating gear and application of the system of disc springs.

The first modification sprang from the adoption of firing with high angles of elevation, of which we shall speak further on. In order to obtain this it was absolutely necessary to cut down the middle transom of the carriage and to raise the horizontal part of the fore transom.

The second modification was rendered desirable on account of the inconveniences experienced in practice from the elevating gear.

With this modification the platform is supported by four cast-iron rollers, which run on the platform rails, two being placed in front and two behind, in framings or casings, which support a guide rod which traverses the side framing, fixed to the platform, containing six disc springs.

The application of the disc springs to the platform has rendered the service of the 28-cm. howitzer much less fatiguing, and has also led to the great advantage of being able to diminish the number of men to serve it.

Disappearing Gun-carriage with Hydro-pneumatic Platform (Armstrong) for 28-cm. Howitzer (11-inch).—Although our gun carriage and platform for the 28-cm. howitzer leaves little to be desired as regards facility in serving or resistance, yet, in consequence of researches made by the Armstrong firm, experiments were made with disappearing carriages fitted with hydro-pneumatic platforms, which allow a vertical angle of fire of from 45° to 75° , and a horizontal all round fire (360°).

These carriages having given satisfactory results after being experimented with, and account being taken of the important advantages resulting from the large horizontal arc of training which they allow, of their comparatively simple method of fixing, and of their taking up less space in battery than the ordinary carriage and platform, they were introduced into the Service (see *Giornale d'Artiglieria e Genio*, A.D. 1888, p. 334) particularly for placing in batteries designed for indirect laying.

The disappearing carriage weighs about 8 quintals ($15\frac{3}{4}$ cwt.), and is formed of two blocks united by a transom, on each of which is a trunnion-hole with a capsquare joined by bolts.

The hydro-pneumatic platform weighs about $9\frac{1}{2}$ quintals ($18\cdot7$ cwt.), and consists of two brackets (or cheeks) with two polished surfaces, on which the carriage runs.

The brackets rest on a system of girders braced by transoms, and at the back end of the brackets are fixed the cylinders, within which the cylinder-rods work.

On the upper surface of each cylinder is a buffer, formed of several layers of felt and grease, pressed between two discs, through which bolts are passed. The upper disc serves as a brake for the recoil of the carriage.

The platform is supported by fourteen rollers, and has the turning gear

fixed to the left of it ; this gear is worked by a hand-wheel, and allows, when the shaft and pinion which work on the toothed arc fixed on the guide are set in motion, of the whole being revolved.

The elevation of the howitzer is effected by the elevating gear, which is worked by two fly-wheels, one on either side of the platform.

The recoil of the piece is checked, and the automatic recoil in battery effected, by means of the hydro-pneumatic brakes, which consist of two cylinders which are fixed to the brackets ; each cylinder is divided into two chambers. One, by means of its piston, bears the weight of the piece on recoil, whilst the other, which contains glycerine and air, communicates with the first through the recoil valve and the lifting valve. The glycerine and air chamber can be got at directly by a screw tap, which is fitted with a leather ring.

The cylinders communicate with each other by means of three tubes ; the first connects the two recoil presses underneath, the second, which also passes underneath, connects the two elevating presses, and the third, a thinner one, is on top of the elevating presses.

The upper end of the recoil press is fitted with a collar, hermetically closed, and a filling tap is screwed on to the communication tube of the elevating press.

The glycerine and compressed air chambers are filled by the aid of an air pump, which compresses the air to a pressure of about 89 atmospheres (1,308 lbs.).

The platform base (or substructure) consists essentially of a track secured to cramps embedded in a concrete basement. The fourteen rollers which support the platform rest on and travel over this track ; the toothed arcs, by means of which the complete rotation of the system is rendered possible, are fixed within the inner circumference of this track.

The operation of charging the cylinders of the carriages to the required pressure by the air pump only, or of re-establishing the pressure when diminished, whilst firing is going on, by loss, escape of air or glycerine, by the bursting of the communicating tubes between the hydro-pneumatic cylinders, or by deformity of the valve, &c., is long and fatiguing, and requires about three hours for each carriage.

In order, therefore, to obviate such a grave inconvenience, every battery, in addition to tubes and spare valves, is supplied with compressed air cylinders of the Nordenfelt type (one for each piece) by means of which air can be easily introduced into the hydro-pneumatic cylinders of the carriages by simply connecting them together ; an operation which takes from four to five minutes to effect.

The Nordenfelt cylinders are charged either by a steam engine suitable for the purpose where there are many batteries, or, in isolated batteries, by means of a hand-pump, and they are always kept ready charged in the battery so as to be available on every occasion.

Ammunition.

No innovations have been made as regards projectiles, but substantial alterations have been introduced in regard to fuzes and powder.

Fuzes.—In 1885 a percussion fuze was designed for projectiles loaded from the base which was to serve both for 32 and 24-cm. (12·6-inch and 9½-inch) shot as well as for the 28-cm. (11-inch) shell—a small lead tube filled with a mixture (for delay) being used with the latter in order to ensure the bursting of the shell being delayed until penetration had ceased.

This fuze, which had consequently to be used both when firing with heavy charges from guns, *i.e.*, with high initial velocities—and when firing with

reduced charges from howitzers, *i.e.*, with low initial velocities—was of somewhat complicated construction. Nevertheless it was adopted in 1886, under the name of "Percussion fuze for 32 and 24-cm. shot" (v. *Giornale d'Artiglieria e Genio*, A.D. 1886, p. 19).

Subsequently a more simple percussion fuze having been designed for the 15-cm. (6 inch) shot, its use was extended to those for coast defence; a new fuze was thus introduced for siege and coast projectiles (*Spoletta per palla d'assedio e da costa*, 45, 40, 32, 24 and 15-cm.),¹ and the employment of the original fuze for 32 and 24-cm. projectiles (delay) was limited to the 28-cm. shell, and as such took the percussion fuze for 28-cm. shell—*Spoletta a percussione per granata da 28* (v. *Giornale d'Artiglieria e Genio*, A.D. 1887, p. 590, and 1888, p. 123).

Meanwhile a percussion fuze—for shells loaded from the head, of the type M. 1880, but much more sensitive, was designed for use at first in short guns with reduced charges: this fuze, which has a delay tang, is styled Percussion fuze M. 1885 (*Spoletta a percussione*, M. 1885) and was adopted in 1886 for the 21-cm. shell and for the 24-cm. mine shell—*Granata mina* (see *Giornale d'Artiglieria e Genio*, A.D. 1886, p. 1898, and 1887, p. 578).

The increased sensitiveness of this fuze was obtained, 1st, by increasing the weight of the screw plug of the percussion cap carrier by introducing into its head molten and compressed lead; 2nd, by increasing the weight of the pellet. With these modifications the action of the fuze was assured, whether at the moment of discharge, or on graze under the most unfavourable conditions.

Thereupon, in order to simplify the employment of the various fuzes in use, experiments were undertaken to ascertain whether difficulties would not occur in using the fuze M. 1885, with its sensitive priming when firing, and especially when handling loaded 32 and 24-cm. shell.

The experimental trials, however, carried out with the 15-cm. (5-inch) gun, with 20 lbs. charges, proved the possibility of using without danger the fuze (M. 1885) even when firing 32 and 24-cm. guns.

The trials for ascertaining the safety in the handling of the fuze consisted in finding out from what height it was necessary to drop 32 and 24-cm. shells to set the fuze in action. The result of these trials demonstrated the practical safety of fuze M. 1885; but by an excess of prudence it was laid down that the priming of the shell should only be inserted when the shell was actually on the loading plate.

Thereupon the use of this fuze (without safety pin) was extended to the 32 and 24-cm. shells (see *Giornale d'Artiglieria e Genio*, A.D. 1888, p. 413).

Powder for 24-cm. (9½-inch) Guns.—It having been ascertained that large grain powder, N. 2 (cubes), after absorbing moisture loses a good deal of its ballistic power, suitable experiments were made with powder not artificially moistened, but kept for a winter in the powder magazine at the Cirié Camp, and also with powder artificially moistened to 1·5 per cent., and then dried in the sun.

The results obtained when fired from a long 24-cm. gun are shown below (p. 245).

The deduction from these results is that cubical powder after absorbing moisture, even in moderately small quantities, becomes undoubtedly unserviceable for the purpose for which it is destined; for if it is used without drying, its ballistic power is excessively lessened, whilst if it is dried, even in the sun, its quick burning attains absolutely inadmissible proportions, changing the internal structure of the grain and consequently altering the slow combustion character of the powder.

¹ Vide *Giornale d'Artiglieria e Genio*, A.D. 1887, p. 567.

Powder not Artificially Moistened.

Number of rounds.	Weight of projectile.	Charge.	Mean velocity at 50 metres from muzzle.	Mean pressure.		Distance between base of projectile and section at the breech.
				Rodman.	Crushers.	
4	lbs. 322	lbs. $61\frac{3}{4}$	feet. 1346	tons. 12·09	tons. 12·095	inches. 42·244

The initial velocity from firing table is 1,427 feet.

Powder Artificially Moistened to 1·5 per cent., and then Sun Dried.

1	322	$61\frac{3}{4}$	1433	21·11 ¹	21·81	42·4
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¹ High pressure.

In consequence of this state of things it was ordered that cubical powder was never to be sun dried (see *Giornale d'Artiglieria e Genio*, A.D. 1885, p. 22, &c.), and that the charge for the 24-cm. guns should be raised to 30 kilog. (66·13 lbs.), so that the additional 2 kilog. should compensate for the diminution in ballistic power of the damp powder; at the same time, however, it was decided gradually to substitute progressive powder for cubical powder.

Experiments having proved that a charge of 68·34 lbs. of progressive powder, No. 2 (the same as employed for the 32-cm. gun), fired from the long and short 24-cm. guns gave initial velocities differing but slightly from those produced by 66·14 lbs. of cubical powder, with internal pressures much lower than the maxima allowed for the said powder, progressive powder was adopted for the 24-cm. guns as well, and suitable bags were prepared accordingly (see *Giornale d'Artiglieria e Genio*, A.D. 1885, pp. 210 and 211).

The substitution of progressive for cubical powder is now completed.

Incendiary Charge for 24-cm. Shell-mines (Granata-mina) and 28-cm. Shells.—In view of the indifferent results obtained from the carcass composition in cylinders employed in the incendiary charges of shells, suitable experiments were made with various incendiary substances, and for this purpose small incendiary cylinders (*cilindretti incendiari*), similar to the French, were at last adopted and employed for the loading of 24-cm. shell-mines (*granata-mina*) and 28-cm. shells.

Loaded in this manner the 24-cm. shell-mine contains 12·56 lbs. of powder and 94 small cylinders, and the 28-cm. shell 62·83 lbs. of powder and 111 small cylinders.

Gun-cotton Charge for the 28-cm. Shell and for the 24-cm. Shell-mine.—Meanwhile studies and experiments were being indefatigably pursued on explosives of a yet more powerful nature than powder for use in the bursting charges of projectiles. These researches led to the adoption of gun-cotton in grains for the 28-cm. shell and for the 24-cm. shell-mine (see *Giornale d'Artiglieria e Genio*, A.D. 1887, p. 567).

This gun-cotton was obtained in bulk from the firm of Wolff at Walsrode.

The gun-cotton which forms the bursting charge of these shells is moist, *i.e.*, it contains from 18 to 22 per cent. of water, and is dressed into prisms of the following dimensions :—

Minimum .. $12 \times 12 \times 22$ mm. = $0.472 \times 0.472 \times 0.866$ inches.
 Maximum .. $14 \times 14 \times 24$ „ = $0.551 \times 0.551 \times 0.945$ „

The 24-cm. shell-mine is loaded with about $16\frac{1}{2}$ lbs. and the 28-cm. shell with about 17.63 lbs. of this kind of wet gun-cotton.

Paraffin mixed with vegetable wax (Carnauba wax) is employed to keep the bursting charge in proper position.

Small cylinders (or pellets) of dry gun-cotton, *i.e.*, containing only from 1 to 2 per cent. of moisture, are employed to cause the explosion of the wet gun-cotton.

The fuze used for the 24-cm. shell-mine is the 1885 pattern, with an appendix screwed to the body intended to receive the head of the fulminating cap.

The appendix is threaded externally, so as to allow the case (an empty steel cylinder), which contains the pellets of dry gun-cotton, to be screwed on to it.

These pellets have a diameter of about 24¹ mm. (0.95 inch) and a length of about 50 mm. (1.97 inches). They are covered with paraffined paper, and five of them form the loading of the case: the top one is perforated to make room for the cap.

The cap causes the explosion of the dry gun-cotton, which in its turn explodes the wet prismatic cotton; it contains 1 g. ($15\frac{1}{2}$ grains) of fulminate of mercury, covered with a layer of pressed powder, so as to give a slight delay in the explosion of the projectile.

The 28-cm. shell fuze (without delay), fitted with appendix, cap, and case, similar to that used for the 24-cm. shell-mine, is employed for the 28-cm. shell. The pellets have a diameter of 30 mm. (1.14 inch), and three of them form the loading of the case.

Laying and Firing. Range-finders.

The continuous improvements introduced in regard to the horizontal armour of ships made it incumbent to have recourse to high-angle fire, in order to penetrate the deck armour of ships and to inflict damage on their vital parts.

After a long series of experiments, it was decided to adopt with the 28-cm. howitzer vertical fire of from 45° to 62° , experience having shown that when fired with angles in excess of 62° and up to 75° , the accuracy of the fire sensibly diminished, in consequence of the disturbing effect produced by the air on the flight of the projectile.

The firing tables, within penetrating range, are calculated for 14 charges of 11 lbs., $12\frac{1}{2}$ lbs., 13.22 lbs., 14.33 lbs., 15.43 lbs., 17 lbs., $18\frac{1}{4}$ lbs., 20.94 lbs., 23.15 lbs., 26 lbs., and 28.8 lbs. of large grain powder No. 1, and 31.97 lbs., 40.12 lbs., and 44 lbs. of progressive powder No. 1; the first eleven being contained in a cloth bag as reduced charges for the 28-cm. howitzer, and the others in a cloth bag for the 28-cm. howitzer.

The firing tables, both for the 28 and the 24-cm. howitzers, have been calculated for batteries on the sea level: suitable tables being worked out and lithographed for batteries placed at varying height above the sea.

With a view to protecting the gun detachments and matériel in the batteries, numerous experiments were made in the indirect laying of coast howitzers, and a system of indirect laying by means of rails and graphometers was adopted; at the same time, every suitable arrangement was made for signalling from outside to the battery the necessary data for laying and firing the guns. With this system, which certainly has many opponents, although

¹ This diameter is liable to alteration in consequence of experiments which are now being made.

the laying and firing of coast howitzers is somewhat complicated, the advantageous employment of disappearing carriages and hydro-pneumatic platforms is rendered possible; and it is also possible to have even low-placed coast batteries under good conditions, both as regards service of personnel and matériel, as well as resistance to the enemy's fire.

The proposals of Captain Braccialini as to the introduction of certain modifications in the Amici vertical base range-finder having been accepted, the alteration of these into vertical base range-finders, 1886 pattern (Braccialini), was quickly taken in hand (see *Giornale d'Artiglieria e Genio*, A.D. 1886, p. 437).

The effect of these modifications has been to make the range-finder more accurate, and also to simplify its employment. By the first half of 1889 all the Amici telemeters will have been altered.

A series of comparative trials between horizontal base range-finders designed by Captain Braccialini and those of Madsen and Goarault of Trommelin having been carried out, the coast range-finder with horizontal base, 1886 pattern (Braccialini), was adopted (see *Giornale d'Artiglieria e Genio*, A.D. 1888, p. 17), and the low-lying coast batteries are already provided with them.

On the proposal of Major Sollier, R.A., and Captain Braccialini, R.A., experiments were made at Spezia with "telegoniometers" to direct fire from stations outside the batteries, and to concentrate the fire of several batteries on the same object.

This important problem was satisfactorily solved, and "telegoniometers" with direct sighting (*telegoniometri a visione diretta*) were adopted (see *Giornale d'Artiglieria e Genio*, A.D. 1888, p. 281) as subsidiaries to the battery range-finders; and telegonometric stations, bearing on the same point on the water, were established for directing the fire from groups of batteries.

Another invention, of no great importance, but very useful in practice for training the troops in serving the coast batteries, is the adoption of reduced coast fire (*tiro ridotto*), evidently on the Morris tube principle.

The reduced fire from 24 and 32-cm. guns and from 28-cm. howitzers is carried out by introducing a small 7-cm. ($2\frac{3}{4}$ -inch) cannon into the bore of the gun and firing from it a $2\frac{3}{4}$ -inch unringed shell loaded with sand.

For guns, the cartridge used contains 1·87 lbs. of large grain No. 1 powder, and the gun is laid as if for ordinary firing, except that suitable volutes have to be used for the automatic tangent sights, and range tables specially drawn up for this method of firing.

For the 28-cm. howitzer seven charges were used, viz.: 5·29 ozs., 6 ozs., 7·05 ozs., 7·94 ozs., 8·82 ozs., 9·7 ozs., and 11·46 ozs. of fine grain powder No. 2; and for the 24-cm. howitzer five, viz., 5·29 ozs., 6 ozs., 7·05 ozs., 8·82 ozs., and 11·46 ozs. of the same kind of powder.

The firing tables are worked out for the several batteries from 1,500 to 3,700 metres for the 28-cm. howitzer, and from 1,400 to 3,800 metres for the 24-cm. howitzer.

It results, therefore, from what we have said, that at the end of 1888 our coast matériel consists of—

- 45-cm. G.R.C.¹ B.L. guns.
- 40-cm. A.R.C.² B.L. guns.
- 32-cm. G.R.C. B.L. guns.
- 24-cm. G.R.C. B.L. guns, long and short.
- 28-cm. G.R.C. B.L. howitzers.
- 24-cm. G.R.C. B.L. howitzers.

The principal data in connection with this matériel are reproduced in the following tables A, B, C.

¹ G.R.C. = hooped and rifled cast-iron gun.

² A.R.C. = hooped and rifled steel gun.

Table A.

Gun.	45-cm. G.R.C. B.L. gun.	45-cm. G.R.C. B.L. gun.	32-cm. G.R.C. B.L. gun.	28-cm. G.R.C. B.L. howitzer.	Long 24-cm. G.R.C. B.L. gun.	Short 24-cm. G.R.C. B.L. gun.	24-cm. G.R.C. B.L. converted howitzer.
Calibre	17.72	15.75	12.64	11.02	9.45	9.45	9.45
Furnace charge	72.83	..	35.43	11.81	18.01	16.73	5.91 ¹
Weight of casting	66.38	..	31.49	10.12	15.67	13.79	5.07 ¹
{ body	47.19	..	21.3	6.01	11.11	9.14	2.72 ¹
{ hoops	50.63	..	15.75	4.35	6.1	5.8	1.47
Weight of gun { breech-piece	19.68 ²	..	7.82	4.29	3.6	3.6	3.25
{ swinging tray	441	..	412.26 ²	22.6 ²	63.93 ²	63.93 ²	61.73 ²
{ total	99.11	119	37.6	10.62	17.42	15.16	4.49
Preponderance (breech closed)	74.8	7	17.32	44 lbs.	Nil.	Nil.	-55 to +55 lbs.
Cost { materials { hoops	4,248	..	1,040	276	360	360	24 ³
{ other materials	1,044	..	420	204	280	246.8	24 ³
{ labour	2,000	..	300	200	240	240	48 ³
Cost per kilogram of gun	7,292	36,800 ⁸	1,760	680	880	846.8	72 ³
{ number of grooves	1.81	7.60	1.15	1.56	1.24	1.37	1.95
{ twist in feet	64	92	48	64	24	24	56
Rifling from right to left { inclination of grooves ... degrees	88.58	65.61 ⁵	76.28	32.15	49.21 ⁴	49.21 ⁴	24.10
{ width	2° 59' 10"	32.8 ⁶	2° 59' 50"	5° 7' 50"	50.37	50.37	5° 53' 50'
{ depth	0.574	0.36	0.51	0.39	2° 52' 40"	2° 52' 40"	0.37
Distance between base of projectile and section at breech	0.098	0.078	0.12	0.07	0.82 to 0.63	0.82 to 0.63	0.07
Space allowance in the distance of the projectile { from section at breech	88.3	92.9	69	28	41.5	41.5	20.5
{	+0.31	..	+0.23	+0.19	+0.19	+0.19	+0.19
{	-0.31	..	-0.23	-0.19	-0.19	-0.19	-0.19

Table A—continued.

Gun.	45-cm. G.R.C. B.L. gun.	45-cm. G.R.C. B.L. gun.	32-cm. G.R.C. B.L. gun.	28-cm. G.R.C. B.L. howitzer.	Long 24-cm. G.R.C. B.L. gun.	Short 24-cm. G.R.C. B.L. gun.	24-cm. G.R.C. B.L. converted howitzer.
Capacity of powder chamber	17,454	23,434	7,128	1,511	1,977	1,977	549
Breech system.....	screw steel expansion ring	wedge	Sc.S.E.R.	Sc.S.E.R.	Sc.S.E.R.	Sc.S.E.R.	Sc.S.E.R.
Length {	370	500 ⁹	252	100	208	167	85 5
bore, exclusive of socket for expanding gas	20·9	..	19·9	9	22	17·6	9
check ring	64·17	73·8	49·7	14·5	39·4	39·4	6·7
bore in calibres	393·7	551·2	270	112·7	222·7	181·9	9·9
powder chamber, not including the cone..	22·2	35	21·4	10·2	23·5	19·2	10·47
total from muzzle to breech	3	3 ¹⁰	2	2	2	2	1
total in calibres.....	13·82	..	7·28	5·12	5·12	5·12	2·53
Number of layers of hoops	27·4	23·8	18·7	13·58	14·56	14·56	8·48
Thickness of breech coil							
Total thickness of walls at breech							

¹ For a 22-cm. M.L. howitzer.² With small obturating ring.³ Cost of conversion. The total cost of the converted howitzer is 348l.⁴ For the restricting and directing sides.⁵ At breech.⁶ At muzzle. The final twist is constant for a length of 26 inches from the muzzle.⁷ Has no preponderance, as it has no trunnions.⁸ Exclusive of custom-house dues, but including cost of transport.⁹ Length measured from front face of wedge.¹⁰ Only the layers over the breech lining are counted : the A-tube is also hooped as far as the muzzle.

Table B—continued.

Ammunition and firing data.	45-cm. G.R.C. B.L. gun.	45-cm. G.R.C. B.L. gun.	32-cm. G.R.C. B.L. gun.	28-cm. G.R.C. B.L. howitzer.	Long 24-cm. G.R.C. B.L. gun.	Short 24-cm. G.R.C. B.L. gun.	24-cm. G.R.C. B.L. converted howitzer.
Density of charge	0·77	0·85	0·73	0·807 for charges > 32 lbs.	0·925	0·925	0·59 for charge > 456 to 758
Initial velocity { Shell..... feet Shot..... " }	.. 1,480	.. 1,804	1,623 1,467	466 to 1,030 ..	1,542 1,427	1,476 1,378	
Velocity { Shell at 1,000 metres " " and 2,000 " " "	.. ..	.. ..	1,398 1,230	.. ..	1,316 1,148	1,276 1,145	
(1,094 " " "	1,385	..	1,316	..	1,256	1,230	
and 2,187 " " "	1,296	1,575 at 2,500 m.	1,200	..	1,152	1,132	
Total energy { Shell ft. tons at muzzle { Shot " "	.. 32,839	.. 46,136	10,736 11,414	.. ..	4,575 4,682	4,194 4,366	
Total initial energy per cm. of circumference of shot..... " "	232	367	115	..	62	59	
Energy { Shell at 1,000 m. " " at 1,000 " 2,000 m. " "	.. ..	.. ..	8,037 6,229	.. ..	6,261 2,231	3,155 2,541	
and 2,000 Shot at 1,000 m. " "	28,751	..	9,186	..	3,629	3,481	
metres " 2,000 m. " "	25,190	35,325 at 2,500 m.	7,653	..	3,051	2,948	
Energy per cm. { at 1,000 m. " " of circumference at 2,000 m. " "	203·5 178	.. 263 distance not stated	92 76·6	.. ..	49 41	47 40	
Maximum range of shell fire..... yds.	..	..	8,749	8,858	9,843	9,843	5,140

Table B—continued.

Ammunition and firing data.	45-cm. G.R.C. B.L. gun.	45-cm. G.R.C. B.L. gun.	32-cm. G.R.C. B.L. gun.	28-cm. G.R.C. B.L. howitzer.	Long 24-cm. G.R.C. B.L. gun.	Short 24-cm. G.R.C. B.L. gun.	24-cm. G.R.C. B.L. converted howitzer.
Maximum range { Pounding . . . yds. for shot { Perforating . . . ”	8,749 2,187	10,390 ¹ 10,390 ¹ (sic)	8,749 2,187	.. ..	9,843 2,187	9,843 2,187	
Thickness of { at 1,000 metres inches iron plating { (1,094 yds.) pierced by { at 1,500 metres ” shot { (1,640 yds.)	.. 21·26	.. 16·93 at 2,500 m. (2,734 yds.)	.. 13 78	..	9·45	9·45	

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¹ Allowed by gun-carriage.

Table C.

Carriages.	45-cm. G.R.C. B.L. gun.	40-cm. G.R.C. B.L. gun.	32-cm. G.R.C. B.L. gun.	28-cm. G.R.C. B.L. howitzer.	Long 24-cm. G.R.C. B.L. gun.	Short 24-cm. G.R.C. B.L. gun.	Converted 24- cm. G.R.C. B.L. howitzer.
Defensive barbette with box sides. Centre pivot platform and three cylin- ders.	Armstrong's hydraulic system for revolving turret.	Defensive barbette. No. 7 front pivoting plat- form, two cylinder brakes.	Defensive, with box sides. No. 13 central pivot platform, brake with one cylinder only.	Defensive barbette, front pivoting platform, brake with one cylinder only.	High ¹ Plat- form No. 1.	Low ¹ Plat- form No. 5.	Defensive, Platform No. 12 front pivoting, two bow-compres- sor friction brakes, one breaching. 70
Height of axis of piece inches	135·8	126	74·6	109·5	96·8	96·8	+ 41·5—10°
Genouillere..... "	102·4	102·4	..	90·5	78·75	78·75	18·89
Vertical arc of fire degrees	+ 20—6°	+ 13—5°	+ 75—5°	+ 32—8°	+ 20—15°	+ 20—15°	2·795
Weight of gun carriage cwt.	322·8	..	101·37	54·13	55·11	55·11	Metal, con- verted from the masonry and granite platform of 22-cm. gun.
Weight of platform.... tons	29·034	..	14·861	8·021	6·186	5·0	
Platform base	Metal on square with granite bot- tom.	Metal with two tracks on granite.	Metal and wood for up- per part of circumfer- ence, lower parts in gra- nite.	Metal with lower part in masonry and sector.			
Cost of carriage and platform	2,392l. 1876, p. 3.	4,000l. ² <i>Rivista</i> , April, 1886.	1,744l. 1877, p. 29.	958·8l. 1882, p. 876.	620l. 1884, p. 103.	416l.	176l. 1883, p. 211.
See articles in <i>Giornale d'Artiglieria e Genio</i> , part 2, and in <i>Rivista d'Artiglieria e Genio</i> .	1880, pp. 745 and 1073. 1881, p. 913. 1884, p. 292, vol. 4.		1881, pp. 946 and 1194. 1884, p. 292, vol. 4.	1883, p. 284. 1884, p. 335. vol. 4.	1875, p. 337. 1876, p. 335. 1884, p. 292, of vol. 4.		1884, p. 292, vol. 4.

¹ The long 24-cm. gun can exceptionally be mounted on the low carriage with platform No. 5, and the short 24-cm. gun on the high carriage with platform No. 1, but the platforms are not interchangeable.

² Cost of buying the carriage alone without gear.

The following gives a *resume* of the chief studies and experiments actually being made on the subject of our coast matériel.

Tubing of Coast Guns.—The duration of service of the 24-cm. and 32-cm. cast-iron guns is somewhat limited in consequence of the rapid corrosion in the powder chambers and at the commencement of the rifling produced by the heavy charges of slow burning powder: the consequent advance of the projectile in the bore thus modifying the conditions of discharge.

Long experience with a 9-cm. B.L. Parsons gun of manganese-bronze having shown the great resistance which this metal offers to the corrosive action of the powder gases, trials are now being made to reline with it a 32-cm. gun rendered unserviceable through corrosion.

The retubing will be limited to the portion of the bore which corresponds to the double hooping of the gun. After suitably enlarging the portion of the bore which is to be replaced by the tube, the tube will be introduced and lightly forced into the gun and will then be compressed with a steel, or very hard iron mandrel, in the same manner as is done with bronze guns.

If these experiments should prove as successful as is anticipated a sufficiently economical method will have been found for prolonging the service of coast guns, and one which can be applied as well to the coast howitzers and 15-cm. G.R.C. B.L. guns.

24-cm. and 28-cm. Steel Torpedo-shells.—In order to be able to throw larger quantities of powerful explosives, trials are being made, for use with the 24-cm. and 28-cm. howitzers, of steel shell which have a large internal capacity. These are called torpedo-shells (*granate-torpedini*).

The 24-cm. torpedo-shell consists of a cylindrical steel jacket with removable cast-iron ogival head: in this jacket is inserted a zinc casing which contains the gun-cotton or other powerful explosive. The fuze, which is similar to the one already described, has a body, however, of larger diameter than the 1885 pattern with pellet and priming of the 1885 pattern; to the body is attached the appendix for the fulminating cap and to the appendix the case which contains the pellets of dry gun-cotton.

Two types of 28-cm. torpedo-shells are being experimented with; one of which has the filling hole in the head and the other at the base.

The shell with loading hole in the head consists of a steel cylindrical casing with movable ogival head, also of steel, fitted with a fuze similar to the 24-cm. torpedo shell. The wet gun-cotton in discs, to the weight of about 44 lbs., or other explosive, is introduced directly into the casing.

The other torpedo-shell, filled from the base, has a chilled head with screw base, and carries a fuze similar to the one employed for the cast-iron shell, loaded with granular gun-cotton, or another kind of fuze which is being experimented with; the gun-cotton in discs, over 44 lbs. in weight, or other explosive, is introduced directly into the casing.

Both these torpedo-shells, in weight and length, about equal the ordinary cast-iron shell.

Shrapnel Shell for Coast Artillery.

In order to defend the lines of torpedo mines from being fished for by boats, and to act against landing boats, it was decided to try the effect of shrapnel shell from coast artillery; the experiments for the present being limited to calibres of 32-cm. (12·6-inch).

After trying a few types the trials are now being continued with a shrapnel having a steel casing, iron diaphragm, and base filling.

The casing has a movable ogival head, and the iron shot, which have a diameter of 1·89 inches, are arranged in layers which are kept in position by perforated discs. The projectile weighs about 593 lbs., and the experiments, so far as they have gone have given excellent results.

THE TRAINING OF THE GERMAN RECRUIT.¹

(Translated by the kind permission of the Author by Lieut. G. F. ELLISON,
2nd Batt. L.N. Lancashire Regiment.)

Introductory Remarks.

For the benefit of those readers of this Journal who have had no opportunity of personally studying the German Army, a few words regarding the system of training the recruit, which obtains in it, may not seem out of place as an introduction to the "Weekly Tables of Work," which Captain von Busse has kindly allowed to be translated.

Like everything else in the German battalion, the recruit's training is mainly influenced by one great principle, viz., the personal responsibility of the Company Commander. The German Captain has his raw recruits handed over to him in the first week in November, and he has to bring them up to a certain standard of efficiency, and that a high one, in rather over twelve weeks, as at the end of that time the Commander of the three battalions, which form a German regiment, will inspect in a most searching manner the recruits of each company, and every Officer knows full well that to a large extent his chances of promotion depend upon the way in which his men then acquit themselves. As regards the method of training, the Captain is practically unfettered by regulations, and no one has a right to interfere with what he thinks fit to do, unless such action is directly contrary to the spirit of existing regulations or manifestly would give but insufficient results. Some officers have their own systems of training their men, while, on the other hand, others are glad to borrow ideas from such works as that by Captain von Busse.

The actual method of working out in practice whatever system of training is considered best, is to all intents and purposes universal. The normal peace strength of a German company is 1 Captain, 2 or 3 subalterns, 14 non-commissioned officers, 13 lance-corporals, and 117 or 118 privates. The Captain knows that each year in November he will receive some forty-eight recruits, for whose training he will be responsible. As soon, therefore, as the autumn manœuvres are over in September, he sets to work to get his training staff in readiness. He tells off one of his subalterns as the Officer who will be in charge of the recruits. After the arrival of the recruits this Officer's sole duty will be to superintend their training and instruction and to see that everything is carried out in accordance with the Captain's wishes. To assist him in his work he will have a staff of 4 non-commissioned officers² and 8

¹ Die Ausbildung der Rekruten der Infanterie in Wochenzetteln unter Berücksichtigung des neuen Exerzier-Reglements, sowie der neuesten Verordnungen und Vorschriften aus der Praxis zum Gebrauch für Offiziere und Unter-Offiziere, bearbeitet von Von Busse, Hauptmann und Kompagnie-Chef im Grenadier-Regiment König Friedrich Wilhelm II. (Pommerisches) No. 2. Zweite Auflage. Berlin, 1888. Verlag von A. Bath. Pamp., pp. 46. Price 6d.

² Non-commissioned officers in the German Army are almost without exception men with less than twelve years' service, as after that time they have a claim on some post under Government, of which the great majority avail themselves. German regimental Officers state that want of experience on the part of their non-commissioned officers increases the difficulty of training their men to an enormous extent.

lance-corporals, with the addition of 1 non-commissioned officer and perhaps 1 lance-corporal as assistant, who will pay especial attention to musketry. On the recruits joining the company they are at once told off into four *Korporalschaften* or squads, each of twelve men, under a non-commissioned officer, with two lance-corporals to assist him not only in the training but also in maintaining discipline in the squad, which as far as possible is kept together in one barrack room. Of the two lance-corporals, one should be a good gymnast, as he will be specially told off to instruct the recruits in gymnastic exercises.¹ During the next three months then the entire attention of this training staff will be devoted to training the recruits on lines similar to those proposed by Captain von Busse in his "Weekly Tables."

It is hoped that in the translation the technicalities of the actual training have been made comprehensible to the English reader. There is, however, one matter, peculiar to the German Army, which is considered of such importance in the training of recruits that it can hardly be passed over in silence. This is the "*Einzel Ausbildung*," or training of the individual. The German Drill-book, published in September last, in its 1st section lays down: "The foundation of the soldier's entire training . . . is the careful and strict instruction of the individual. Only by the most thorough instruction of the individual can the requisite combined action of numbers be attained. The faulty and incomplete instruction of a recruit, as a rule, affects him prejudicially during his entire service in the performance of his duties. Faults which are allowed to creep in during the initial stages of the instruction are rarely completely eradicated. It is likewise impossible to remedy defective training of the individual by combined practices." In Captain von Busse's book the reader will see what this training of the individual means, viz., that no work is performed by the squad as a whole, either in marching, physical training, the manual exercise, position drill, &c., or indeed in any part of the recruit's course, before each individual has attained a certain standard of proficiency in that particular subject. To this system of individual instruction must be attributed that uniformity of training and military education in the German Army, which is one of its most striking points. Any one who has ever seen German recruits at work will know well what the individual training is in practice. One of the most common sights, for instance, on a German drill-ground is a small squad passing the instructor in single file in ordinary quick time, or with that peculiar high-kicking action which is known as the "marching-past step," a distance of some ten or fifteen paces being maintained between individuals. The instructor closely scrutinizes each recruit as he passes, and should he notice any error, no matter how small, in his position, &c., the luckless offender is sent back at the double to the rear of the squad, to subsequently again tempt fortune, possibly with no better result.

One or two terms which occur in Captain von Busse's book call for some slight explanation. One of these is the practice called "*Rallying*." The object of this is, as may be supposed, to make the recruit handy in rapidly falling in in any ordered formation. It is carried out at no fixed period in the day's work, but if the recruits have been standing for a long time, or the day is cold, the order is suddenly given, either by the Officer to the four

¹ It is very seldom the case that a German battalion has a regular gymnasium at its disposal. In one corner of the drill-ground are erected a few simple gymnastic appliances, *e.g.*, horizontal bars and beams, ropes, ladders, &c. Means are also given for practising applied gymnastics, *e.g.*, a hoarding ten or twelve feet high for ascending, a broad deep ditch, which has to be crossed in heavy marching order, a shallow ditch about twelve feet wide, for broad jumping, &c., &c.

squads of his company or by the non-commissioned officer to his own squad, to fall in at some named spot in a given formation, facing in any direction.

Another rather vague term which implies a great deal is "the independent use of the rifle," so often referred to. This is equivalent to the "Gefechtmässiges Einzelschiessen," or the use of his rifle by the soldier when acting entirely on his own responsibility in the fight, all control of the firing by his superiors having become impossible. In order to create in the men the requisite self-reliance, when thus firing uncontrolled, and to prevent them wasting their ammunition under such circumstances, in other words, to get a proper "fire discipline," the Germans consider that a very advanced knowledge of the theory of musketry is essential for each individual soldier. As evidence of what this knowledge is, the present writer can adduce his own experience, he having on one occasion been present when a squad of young German soldiers was being asked most intricate but practical questions on the trajectory of their rifle, the men giving their answers with a readiness which was indeed marvellous. The German infantry recruit spends about five hours each day in practical work, either on the drill-ground or in the neighbouring country, viz., three hours in the morning and two hours in the afternoon, a break of about two hours, from midday to 2 p.m., being allowed. Besides this he has one hour's theoretical instruction daily, given either by the Officer or the non-commissioned officer of the squad, with a lesson in cleaning and mending his kit, &c., in the evening.

It is only necessary, in conclusion, to add that the infantry recruit, from the very commencement of his course of training, carries his pack, which at first is only lightly loaded, being, however, gradually increased to the full weight which he would have to carry on service. With this weight on his back the recruit will, before the inspection referred to above, have to march on three consecutive days, 15, 20, and 25 kilomètres (about $9\frac{1}{2}$, $12\frac{1}{2}$, $15\frac{1}{2}$ miles).

After the inspection his training and instruction is continued without intermission in the "zug,"¹ company, &c. He has, however, then ceased to be a recruit, for the Germans hope that, in consequence of the great simplification of their drill, &c., due to the new Drill Regulations, they will now be able to convert in the course of twelve weeks a raw material, which under a system of universal conscription is, and must necessarily be, inferior to that of a voluntarily enlisted army, into soldiers fit, if need be, to at once take their place on service in the ranks of one of the most highly trained armies which the world has ever seen.—G. F. E.

The Training of Recruits in the Infantry in Weekly Tables, with reference to the new Drill Book as well as the most recent Orders and Regulations, for the use of Officers and non-commissioned officers. Worked out for practical experience by von Busse, Captain and Company Commander.

Preface to the 2nd Edition.

The new Infantry Drill Book has appeared, and been taken into use. Much that was old is gone, and has given place to new measures adapted to the increased demands of the present day. "Besides completely maintaining the discipline hitherto in force," so runs an Army Order of September 1st, 1888, "the Drill Book is intended to give wider scope in training for the exigencies of the fight." For this reason, it is perhaps necessary that the training of the young soldier should be in character essentially different to that of the

¹ A zug is the 3rd part of a company. The zug is divided into sections, each of from 4—6 files.—TR.

past—it will become considerably more concentrated on the actual objects of the fight, on that end for which the soldier exists, namely, War—the individuality of each single soldier will take its place more prominently in the foreground.

The task of those to whom the training is intrusted increases, however, in proportion as more is expected of the individual soldier. They have to work on a material differing in its quality to no considerable extent from that of former days, when what was expected of it was substantially less.

The new Infantry Drill Book, taken in conjunction with the other recent Regulations, demands in a still higher degree than hitherto not only increased and well-regulated energy on the part of the training staff, but also a most thorough control of the system of training, as it progresses, on the part of the immediate superiors. A proper distribution of time and daily tasks is accordingly one of the foremost problems for those on whom the responsibility falls, and the chief factor in the attainment of the object in view.

I have been induced to publish a new edition of these weekly tables of work, partly owing to the above-mentioned circumstance as well as to the consideration that it cannot be otherwise than advantageous for the training staff to have at its disposal a definite plan on which the young Officer and non-commissioned officer can confidently continue to work, without having to make experiments for themselves—experiments which are doubtful, and not always accompanied by success—and partly, too, in consequence of the favourable reception which my work met with last year.

I, therefore, hand over to my brother Officers these weekly tables, at the same time pointing out that they by no means aim at undermining the individual independence of those who alone are responsible for the recruit's training, but that they are only intended to point out one of the many roads which lead to success. I am quite ready to admit that there may be other ways quite as good as the one which I have proposed.

(Signed) VON BUSSE.

The First Four Days after the Recruit joins the Company.

1st day.—1. Telling off the recruits into squads.

2. Hair-cutting commenced and completed as far as possible.

3. Bathing and medical inspection.

4. Fitting uniform—fatigue dress and drill order—also one pair of boots.

5. Measuring (measurement tables must be prepared beforehand).

6. Recruits made acquainted with the position of the company quarters, the cook-house, and company store-room.

2nd day (morning).—1. Issuing of drill order uniform continued, if not finished on 1st day.

2. Fitting on the uniform which will be worn at the ceremony of taking the oath.

3. Articles of War to be read to the men, and explained by the Company Commander. Forms to be observed in taking the oath.

4. Bathing and medical inspection continued.

Afternoon.—1. Roll-call in drill order.

2. Fitting on uniform to be worn at oath-taking continued.

3. Recruit's surplus money to be received and entered by Company Commander in the deposit account.

4. Colour-sergeant makes a list showing recruit's antecedents, his civil status.

5. Requirements for cleaning kit laid down.

6. One hour's instruction by the non-commissioned officers in the first principles of order and tidiness in barracks.

3rd day (morning).—1. Fitting clothing continued if not completed, issue of second pair of boots and necessities not yet served out.

2. One hour's instruction by the non-commissioned officers, as on previous day; two hours' drill with special reference to the march through the town to take the oath.

Afternoon.—1. Roll-call in uniform worn at oath-taking (uncleaned), afterwards the same to be cleaned under the superintendence of trained soldiers.

2. One hour's instruction by the Officer on the nature of the oath and forms to be observed in taking it.

4th day.—1. Regular duty; subsequently taking the oath.¹

2. Weighing recruits.

3. Giving in all articles of civilian dress, &c. These are placed in a bag, which is sewn up and the man's name placed on it.

WEEKLY TABLES OF TRAINING AND INSTRUCTION.

1st Week.

Dress.—Fatigue dress. On the 4th day the recruits bring their rifles with them when they fall in.

Physical Training.—1st, 2nd, and 3rd groups of exercises² individually each day, as well as various exercises calculated to strengthen all parts of the legs, and make them supple. These consist in raising the leg off the ground and working the ankle and knee-joints, and swinging the leg backwards and forwards.

Physical Training with the Rifle.—Nil.

Rallying.—Falling in in one rank with one pace interval on a named man, an odd or even number, or according to the letters of the alphabet, &c. Principles of dressing and covering must at the same time be taught.

¹ The swearing-in of the recruits is in the German Army made a most imposing ceremony, which takes place usually in the church. There is first of all a short service, with suitable address by the Chaplain; the Articles of War are read out to the men, and then each one takes the oath on the colour of his battalion, which represents the person of the Sovereign. In the cavalry recruits take the oath on the regimental standard, in the artillery on a gun. The oath for Prussian subjects runs as follows: "I, A. B., swear by God, Almighty, All-knowing, this oath, that I will truly and honestly serve His Majesty, the German Emperor and King of Prussia, my gracious Sovereign, under all circumstances by sea or land, and in any other place whatsoever, that I will advance his interests and welfare, that I will ward off from him all hurt and injury, that I will carry out in the spirit and to the letter the Articles of War which have been read to me, and that I will obey the commands and orders which shall be given me, and further that I will conduct myself as it behoves an upright and fearless soldier, who loves honour and duty. So may God grant me salvation through Jesus Christ." The concluding formula naturally varies a little for Roman Catholics and Jews.

Regarding this oath, the words of the present head of the German General Staff, the Graf von Waldersee, in his work for soldiers, will well bear quoting. "Henceforth," he writes, "the colour is the most sacred possession of each honour-loving soldier; its honour is his honour."

The 2nd Article of War also lays down: "Inviolable perseverance in loyalty, as promised in his oath on the colour, is the soldier's first duty. Next in order the soldier's calling demands: fitness for war, courage in every demand which his duty makes on him, and bravery on service, obedience to his superiors, honourable conduct both in the service and out of it, and treating his comrades in a good and upright spirit."—TR.

² This refers to a similar work, which groups the various physical exercises laid down in the German Regulations for Physical Training and Gymnastics.

Saluting.—Passing the instructor individually in a smart natural way without turning the head. Saluting by bringing the right hand to the forage cap.¹

Drill.—Position of the soldier, quick step, changing step. Turnings. Dressing back individually in two motions, keeping the hips braced up. Principles of dressing and covering. Stress to be laid on the importance of remaining motionless in the ranks. Squads, always at open interval, marching in and out of step.² Piling arms.

Manual Exercise.—Nil.

Aiming.—(It is recommended that from the first day onwards the recruits should be practised in aiming by the non-commissioned officer specially told off in the company to look after musketry. This non-commissioned officer's duty must, however, be regarded as only accessory to that of the non-commissioned officer of the squad.)

Explanation of the different kinds of targets. Employment of the sights. Principles of aiming, explanations of the line of sight, line of fire, trajectory being, however, at first quite omitted.

The non-commissioned officer aims a rifle, which rests firmly on a tripod, at a point on a target 20 mètres distant, and makes the recruit say where he has aimed.

The lance-corporal of the squad practises the recruits in closing the left eye, and also in various exercises calculated to make the wrist and hands supple, and to extend the grip of the right hand. (The German soldier is taught to grasp his rifle as firmly with his right hand as with his left.—Tr.)

Position Exercises.—Position drill without the rifle in three motions. The lance-corporal practises the recruits in various exercises with a dummy rifle. (This is used much as clubs are, with the object of strengthening the wrist and arm generally.—Tr.) Further, the recruit will be shown the simple motions of loading, in learning which he will have to assume the so-called "sportsman's position," i.e., no attention is paid to his position being not according to regulation.

Gymnastics.—Nil.

Bayonet v. Bayonet.—Nil.

Theoretical Instruction.—For the first three weeks.

(a.) By the Officer. Articles of War—every recruit must know by heart Articles 2 and 43;³ the oath; universal military service, this to be closely connected with the history of the regiment and of the German nation;

¹ German soldiers always salute with the right hand.

² In Germany, in order to avoid fatiguing the men as far as possible when on broken ground, one very frequently hears the word of command "Ohne Tritt" (out of step), "Marsch," given, and this even at regimental and brigade drills and at manœuvres, when a company column (the invariable formation for movement) has to take up a new position. The men then move off with no pretence at keeping step, but preserving their dressing, sloping their arms correctly, and keeping silence just as they would when marching at attention. On the field of battle deployment for the fight may be in step or out of step; otherwise all movements out of reach of hostile fire are out of step, but in step immediately the companies come under effective fire. "German Drill Book," Part I, § 200.—Tr.

³ Article 2 has been mentioned before in reference to the military oath of allegiance. Article 43 gives the punishments "for sleeping, smoking (when forbidden), or lying down or laying down arms, or leaving a post when on sentry. In peace, medium or close arrest for at least fourteen days, or imprisonment or detention in a fortress for from 3 to 15 years; before the enemy, imprisonment, or detention in a fortress for from 10 years to for life, or death." Grierson, "Armed Strength of the German Empire," Part II, p. 116.—Tr.

genealogy of the Royal House from Frederick William IV to the present day. Procedure in making complaints.

(b.) By the non-commissioned officer.¹

- (1.) Barrack and barrack-room arrangements, especially method of arranging cot, putting kit in cupboard,² &c. Barrack-room orderly duty.
- (2.) Method of making requests and complaints. How to act in case of sickness.
- (3.) Bodily cleanliness. How to clean kit, &c.

General Remarks.—1. Particular attention is to be paid to regularity in barracks and in the barrack-room, also to standing to the cupboard (answering to standing to the cot in our Army—Tr.), to reports made as barrack-room orderly-man, to conduct in passages, on staircases, and in the barracks generally.

2. The men must be practised in making simple reports,³ also instructed how to act on falling in, or if ordered to fall out, in the course of a parade.

3. When marching to the parade ground, picking up step, changing step, front-forming, file-marching “out of step” should be practised.

4. All Officers of the unit to which the man belongs—his immediate superiors first of all—must be pointed out to him as soon as they are seen, and their names told him.

5. One hour daily must be devoted to aiming and position exercises. The close of the morning parade, or the commencement of the afternoon parade, is the best time for these practices.

¹ In connection with this theoretical instruction by the non-commissioned officer, Captain von Busse writes:—

“1. The instructor must take care not to instruct the man in more than is absolutely necessary; he must teach him only so much as it is expedient that he should know.

“2. When a fresh course of theoretical instruction is introduced, he must not put too much before the recruit all at once. He must rather divide the food for his mind into small portions, and not proceed further until he is convinced that what he has already taken in has been thoroughly digested.

“3. He must give his instruction as far as possible on the lines of the existing regulations, and as little as possible out of books of instruction.

“4. The time for theoretical instruction, which usually lasts one hour, should be so regulated that a quarter to half an hour is devoted to repeating what has been previously taught, and the remainder of the time to introducing new matter.

“5. In order to keep the attention of the recruits, which often, especially if the theoretical instruction be given in the evening, will have been already strained by the day's work, it is to be recommended that, when asking questions on what has been taught, the question should first be always put to the squad at large, and then a recruit be named to give an answer. By this means all the recruits are obliged to have their answer ready.

“6. From the very commencement, during the hour of instruction as well as on all duties, stress must be laid on the recruit's behaving well and speaking in a clear and loud tone of voice.”

² In German barracks each soldier has a fairly capacious cupboard with lock and key, in which he stows his kit. There are no shelves as with us.—Tr.

³ In a similar work it is recommended that each day the non-commissioned officer of the squad should give to at least three men of his squad some simple message, which they will have to hand on to the Officer in charge of the company's recruits next morning. It is further recommended that various short messages, which would be likely to be sent on service, should be dictated by the Officer, and written down by the non-commissioned officers in their memorandum books.—Tr.

6. The clothing of the recruits must daily, from the very first, be most carefully inspected.

7. The lance-corporal must never instruct the recruit in anything new, he may only repeat what has been already taught.

8. Polish recruits and those from Elsass-Lothringen, who are weak in German, get two or three hours' instruction weekly from a specially qualified sergeant or lance-corporal.

9. As soon as rifles are entrusted to the recruits, a commencement must be made in instilling into them the elementary principles of the independent use of their weapon.

10. It is to be recommended that twice a week in the evening, instead of the kit cleaning and mending lesson, practical instruction in cleaning the rifle should be even thus early commenced, and that this should be continued during the following weeks.

2nd Week.

Dress.—As last week.

Physical Training.—1st—4th groups individually. The Double, individually. Ankle practice.

Physical Training with Rifle.—1st practice of the physical exercises with the rifle with both arms individually. Also the practice for working the wrist.

Rallying.—Fall in in file turned to right or left, with one pace interval. Principles of covering to be explained at the same time.

Saluting.—Passing the instructor at the attention, with head turned right or left. Saluting with the hand. Fronting and standing to attention.

Drill.—Position of soldier, turnings, dressing back independently with hips braced up, judging the time. Dressing individually in line with one pace interval by both flanks, on files advanced three or more paces in front of the alignment. Slow step in two motions, with hips braced up. Marching the squad in step and out of step, in line, and in file. Principles of the turnings.

Footnote adds: "As regards the value of the slow step, which is not regulation, the most varied opinions prevail. The correct value will be found in this case in a medium course. It is unnecessary to worry recruits who have well-shaped, straight, and supple legs with this extremely severe and fatiguing exercise; it should be applied rather to those only who are clumsy with crooked and stiff legs, and to such as are careless."

Manual and Firing Exercises.—Instruction in carrying the rifle at the slope.

Aiming.—Explanation of medium, full, and fine sights. Necessity of keeping the sights upright, and the foresight exactly in line between the centre of the backsight and the object aimed at. Instruction in the sight, full or fine, &c., to be taken at various ranges, and also the part of the target to be aimed at.¹

The non-commissioned officer makes the recruit aim a rifle at various points on a target, placed at 100 mètres distance, *e.g.*, the bottom of the target, the bull's-eye, &c.

Thorough description of the mistakes made in aiming, with practical instruction in the effects of not keeping the sights vertical, of the tip of foresight not being exactly in the line between the centre of the backsight and the object aimed at, of taking a fine or full sight, without defining the

¹ The standing sight of the present German rifle is 200 mètres, there is also a small flap, which is additional to the leaf of the backsight, for 300 mètres. Such instruction as the above is therefore most necessary.—Tr.

reasons. The recruit will continue to make progress, until he at last aims correctly. Errors in aiming, with reference to § 16 (2) German Musketry Regulations. Practices in loading with dummy cartridges, and in filling and afterwards unloading the magazine, are to be constantly carried on. Practice in closing the left eye. Wrist exercises.

Position Exercises.—Position drill without rifle in one motion. The lance-corporal practises the recruits in shooting out the arm sideways from the shoulder, with the rifle grasped in the hand, to strengthen the arm, also in holding the rifle at full length of the arm in front of the body, and swinging it smartly from side to side to strengthen the wrist. Bringing the rifle to the shoulder, without regard to the regulation position for firing.

Training for Extended Order Work.—On the two days in the week¹ on which the recruits march out into the country, the non-commissioned officers practise their squads, formed as sections of six files, *i.e.*, groups, in the elementary principles of skirmishing with the rifle, according to §§ 127—130, German Drill Book, Part I. (These sections refer to a line extending at the halt and when in motion.—Tr.)

Interval between files, points of direction, how the individual man should act, and his position when in extended order, according to §§ 67—68 new Drill Book, Part I.² Bringing rifle to the shoulder without regard to the regulation position. These occasions must also be utilized to further imbue the recruits with the first elements of the independent use of his rifle.

A footnote adds: "Attention must likewise be paid to this point, *i.e.*, the independent use of the rifle when extended, on every possible occasion; the hours in which practices in aiming and position drill take place are especially adapted to such instruction."

Gymnastics.—Horizontal bar. Grasping the bar, also with both hands reversed and with one hand only reversed. Raising the shoulder to the bar with one hand reversed. Breasting the bar.

Bayonet v. Bayonet.—Nil.

Theoretical Instruction.—(a.) By the Officer. (See 1st Week.)

(b.) By the non-commissioned officers.

Names of and mode of addressing all the non-commissioned officers of the company, and all immediate superiors present in the garrison, and later the higher Officers, who may or may not be in the same place as the battalion, *i.e.*, Regimental, Brigade, Division, Army Corps Commanders.

(2.) Men's conduct in relation to superiors.

¹ The new German Drill Book, § 65, Part I, lays down: "At least twice in the week, as soon as they have served two or three weeks, the recruits must be marched out into the country to be trained in extended order work. This is a decidedly beneficial change during the period of formal drill instruction, which can best be furthered by the recruit bringing with him a certain insight into the practical application of the extended order formations practised on the drill-ground."

² The new German Drill Book lays down, in § 68: "For extended order work, the soldier must be practised in surmounting obstacles, especially jumping over or scrambling through ditches, scaling and climbing over walls, hedges, &c. Likewise he must be able to "steal" over the country, *i.e.*, advance protected against fire, by taking advantage of every bit of cover. At the same time, however, the fact must not be lost sight of, that in the majority of cases the straight way is the best way, and that the individual soldier can almost always find cover by going only a short distance out of his way, and by adapting himself to circumstances, *i.e.*, by stooping or crawling."

With reference to this question of taking cover, § 76 adds, in large type: "All considerations as to cover must, however, be looked on as secondary to those regarding fire-action."

(3.) Regimental organization from the squad up to the regiment inclusive.
General Remarks.—1. Before the midday break in the work, physical training; after the break, drill.

2. Squads fall in every morning in line with intervals, rear rank men covering on front rank.

3. At close of week squads are inspected separately in the position of the soldier, turnings, dressing back with hips braced up.

4. At close of week revision by non-commissioned officer of all theoretical instruction of 1st week.

5. From this time forward the recruits with rifles will be taken out into the country by an Officer, accompanied by a drummer and a bugler. Steadiness in marching and simple evolutions will be practised. The drum is to be played both on the march out and on the way back to quarters, that the recruit's ear may be accustomed to "Time" as soon as possible. By this means the subsequent instruction of the recruits in "Marching past" will become very much easier.

3rd Week.

Dress.—As previously. Belts and side-arms.

Physical Training.—Repeat groups of exercises 1—4 with squads of from 3—6 men. The double, individually. Bending and stretching the knee, ankle exercise particularly to be practised. 5th group of the physical exercises individually.

Physical Training with Rifle.—Practice 2 of the physical exercise with the rifle with both arms individually.

Practice 1 of the position exercises individually.

Rallying.—Falling in in one rank with one pace interval facing to the rear; also falling in on an alignment, oblique to the proper front.

Saluting.—As previously, with addition of saluting by twos and threes.

Drill.—Turnings, dressing back with hips not braced up individually, judging the time. In line with one pace interval, dressing by both flanks on points.

(The non-commissioned officers on the flanks are the "points for dressing on" in the German Army.—Tr.)

Slow step in one motion with hips braced up, the last half of the week with arms behind the back. Now and then the whole squad must pass the instructor in file with hips not braced up, considerable distance between the separate men being maintained.

Manual Exercises.—Instruction in carrying the rifle at the slope.

Aiming.—The non-commissioned officer makes one man aim with his rifle, using the standing (200 mètres) sight and the small 300 mètres flap, while another man checks his aim. Target, if possible, 150 to 200 mètres distant. Simple explanation of the line of sight, line of fire and the trajectory. The man learns the method of pressing the trigger of a rifle, which is lying firmly on a tripod. Aim to be checked according to regulation. Musketry Regulations, § 16 (3).

The non-commissioned officers make a rough copy of the results obtained, and enter these in a special register, kept for the purpose, so that later comparison may be made with subsequent entries, and that the progress of the recruits may be thus tested.

Position Exercises.—Position standing, with rifle, in one motion. The recruit learns the "Ready" position, correctly gripping the small of the butt.

Arm and wrist exercises with the rifle. Bringing rifle to the shoulder, without regard to the regulation position. Practice in loading continued.

Training for Extended Order Work.—Revision by the non-commissioned officer of what has been previously taught.

The Officer forms up the recruits of the company, who are then told off into tactical "groups" of from 4 to 6 files.

Elementary principles of skirmishing to be practised according to regulations, laid down in new Infantry Drill Book, Part I, §§ 127—130. Reformation also to be practised (Part I, § 142). Practical instruction in the independent use of the rifle.

Gymnastics.—(a.) Jumping practice :—Jumping by motions at the stand without spring-board. Jumping without the spring-board with three paces run, right and left leg leading.

(b.) Horizontal bar. Repeat previous practices. Breasting the bar, also with hands reversed. Taking each hand off the bar in turns, when hanging with straight also with bent arms. "Travelling" on the bar.

(c.) Horizontal beam. Simple jumping on and off. Changing position on it.

Bayonet v. Bayonet.—Nil.

Theoretical Instruction.—(a.) By Officer. (See 1st Week.)

(b.) By non-commissioned officer.

(1.) Ranks and distinguishing marks of all superiors, including naval officers.

(2.) Saluting in ordinary as well as in special cases.

General Remarks.—1. Before the midday break in the day's work, physical training with and without the rifle ; after the break, drill.

2. In marching to the drill-ground as well as to the drill-sheds, squads collectively will be practised in saluting.

3. On the drill-ground the recruits are kept thoroughly on the alert by taking measures tending to that end ; frequent changes of position, sudden orders to carry out something unusual will effect this.

4. Examination of recruits in reading and writing.

5. Non-commissioned officer's report, whether helmets and boots fit ; whether the recruits have sore feet or swollen legs.

6. The string, over which the recruit jumps when at jumping practice, will be kept till the commencement of the 6th week in the lowest hole.

7. At the close of the week, inspection of the squads in saluting, fronting, individual marching at the attention ; the double without the rifle individually.

4th Week.

Dress.—Drill order with caps.

Physical Training.—Repetition of groups of Exercises 1—5 with 3—6 men at a time. Group 6 individually. Lifting the legs, bending and stretching the knee ; ankle exercise to be uninterruptedly continued.

Physical Training with Rifle.—3rd practice individually. Practice 2 of the position exercises individually.

Rallying.—As previously in single rank, but without intervals. At the close of the week all the recruits of the company facing the front under the Officer.

Saluting.—As previously.

Drill.—Repetition. Turnings, &c., with 3—4 men at a time, one pace interval judging the time. Dressing individually by the right or by the left with one pace interval on files,¹ the alignment being oblique to the proper

¹ This dressing on files answers nearly to "dressing a line," § 6, Part III, of our Drill Book, three or more files advancing a certain number of paces, according to order, the remainder dressing up on these files.—TR.

front. Slow step in one motion, the first half of the week with arms crossed on the breast, the second half with arms hanging at the side. Quick step (114 paces per minute). Occasionally the whole squad passes the instructor in single file with arms hanging free, a considerable distance being maintained between each individual. Second half of the week, turnings on the march. Passing instructor one at a time with rifles at the slope but "out of step," instruction in carrying the rifle only being aimed at. Occasionally movements in squad in quick time, with front-forming and wheeling in two ranks.

Manual and Firing Exercises.—"The Order." Sloping arms and ordering in three as well as in two motions.

Aiming.—The lance-corporal continues the instruction in aiming, pressing the trigger, loading, &c., as hitherto, while the non-commissioned officer devotes himself more to the position exercises, and repeats the aiming practices only with those who are backward in aiming. Practical instruction in the figure targets¹ and their varieties, at the same time showing them to the recruits. Musketry Regulations, § 8 (3).

Position Exercises.—Ready position and gripping small of butt continued.

Position standing by numbers, without pressing the trigger, but firmly grasping the small of the butt with the palm of the right hand. The muzzle must be slightly supported in front during this practice. Each recruit explains as well as he can in his own words the various motions of coming to the Present.

Training for Extended Order Work.—Instruction on the extended line, in its normal form, repeated by the non-commissioned officers to their squads, and by the Officer to the recruits of the company collectively.

Movements of an extended line § 131. Part I, new German Drill Book.

Likewise making use of ground (free field of fire, getting a rest for the rifle, getting cover) will be explained to the recruits, small detachments of trained soldiers illustrating the instruction. This will be repeated occasionally in the following weeks.

Judging Distance.—Measuring paces. 100 yards laid down accurately and then paced out over different ground surfaces. Draw necessary appliances.

Gymnastics.—(a.) Jumping practice. Repeat. Jump standing in one motion.

(b.) Horizontal bar. Repeat. First position for vaulting the bar. Bending and stretching the arms twice, with hands resting on the bar. Taking hands alternately off bar, when hanging with arms straight, also with bent arms.

(c.) Horizontal beam. Walking upright along the beam.

Bayonet v. Bayonet.—Nil.

Theoretical Instruction.—(a.) By the Officer.

Musketry instruction, with strict adherence to the Musketry Regulations. Especial attention to be given to § 5, and generally to practical musketry.

¹ The figure targets used in the German Army are of a most practical nature. They are made of paper, with a backing of canvas, and represent a German soldier in drill order (*i.e.*, with blue tunic, dark trousers and accoutrements, red facings, with rifle under the arm, and cap on the head). The standing figure is nearly 5 feet 7 inches high, and the Musketry Regulations contain a plate, showing where the figure is to be cut through, if a "head and shoulder" or kneeling, or half or three-quarter length target is required. When required for use this figure is fastened on to a very rough frame, consisting of a lath, varying in length, according to the size of the figure, with two or more cross-pieces nailed to it. These figure targets are used on the range, and also for field-firing. Similar figures of mounted men in life size are also used at field-firing.—Tr.

(This section describes the influence of the atmosphere, of wind, and position of the sun on shooting.—Tr.) Use of the sights and regulations regarding holding the rifle. Independent use of the rifle, according to the Musketry Regulations, § 35.

A footnote adds: "Less will be gained by the recruit having an accurate knowledge of the angles formed by the line of sight with the line of fire, trajectory,¹ angles of elevation, &c., than by his being most thoroughly instructed in the practical use of his rifle."

(b.) By the non-commissioned officer.

The rifle, Model 71/84, and its treatment.

Footnote adds: "Particular attention must be called to the fact that the soldier is only required to know what is printed in larger type in the instructions regarding the rifle, Model 71/84. The recruit will also have already learnt so much concerning the treatment of the rifle during the practical rifle-cleaning hours (see 1st Week), that not many difficulties are likely to present themselves in his further instruction."

Bugle Calls.—During the 4th week the following must be learnt by the recruit:—

Reveille.

1st Post.

Tattoo.

Fire-alarm.

Footnote adds: "The almost universal custom is that the bugle calls are sounded during the cleaning and mending hour, and the instruction in them becomes an amusement for the recruits. The weekly table of calls is handed to the bugler, and he is instructed to sound only the calls prescribed for the particular week, and these slowly and repeatedly one after the other."

General Remarks.—1. When the non-commissioned officer told off in the company for musketry is available, he will henceforward devote each day

¹ The Germans have a most ingenious method of practically showing the recruits what the trajectory of the rifle is at various ranges. Supposing that it desired to show them the trajectory at 400 mètres. The squad is drawn up, and points are thrown out to the front at every 50 mètres up to 400. These men have in their hands a stout lath, about 6 feet long, to which is attached a flat metal disc, painted white with a black bull's-eye in the centre; these discs being larger in size the further the man who holds it is from the squad.

On each lath in succession, *i.e.*, at 50, 100, 150, &c., up to 400 mètres, is marked the proper height of the trajectory for any given distance at the spot where the lath is being held. On the command being given to set the discs at 400 mètres, each man slides the disc to the 400 marked on his lath, and fixes it there by a screw, which passes through the socket, by means of which the disc is attached to the lath. The man at 400 mètres naturally does not move his disc. The men will next be ordered to rest the foot of their respective laths on their waist-belts. The squad of recruits can now be looking at the bull's-eye at each distance, see at a glance exactly what the path of a bullet would be, if they fired from their present position at the breast of a man standing at 400 mètres distance, and between what distances men standing would be safe from their fire. Or the men may be ordered to kneel, and the man at 400 mètres to rest his disc on the ground. The others then rest the butts of their laths on the ground, and the recruits can see what would be the effect of firing kneeling from where they are at the foot of the man kneeling at 400 mètres. The same thing can be done with numerous variations. In the German Army great importance is attached to this knowledge of the trajectory, as being a most important element in the training of the soldier to "use his rifle independently," which means that he must know what firing-position he must be in, what sight he must use, what part of an opponent he must aim at, so as to make sure of hitting, when he is acting entirely on his own responsibility in the fight.—Tr.

three-quarters of an hour or an hour to the aiming and position exercises with the squads. Especial attention is to be paid by him to recruits who have been put back in these exercises.

2. The non-commissioned officers report whether both pairs of boots fit, and whether the recruits have sore feet or swollen legs.

3. At the close of the week the squads are inspected in turnings, dressing independently on files with hips not braced up; jump standing, running jump off spring-board; breasting the bar with hands reversed, also with one hand reversed.

4. Non-commissioned officers revise the theoretical instruction of the 3rd and 4th weeks. Revision by Officer of theoretical instruction of first three weeks.

5. The Officer checks each individual man in aiming during this week: he makes a note of those who aim badly, and continues to check their aiming till improvement is noticed.

Bugle calls are sounded or whistled during the cleaning and mending hours and the recruits made acquainted with them.

5th Week.

Dress.—Drill order with caps.

Physical Training.—Repeat groups 1—6, by half squads, judging the time. The more difficult practices and the 6th group are still to be done individually. The double singly with dummy rifle. The man's position, carrying the rifle at the slope on the right shoulder, must at the same time be thoroughly checked.

Physical Training with Rifle.—Repeat practices 1—3, with 3—6 men at a time. Practice 4 by half squads; also 1st and 2nd practices of the position exercises.

Rallying.—As hitherto, under the non-commissioned officers. Further, all the recruits of the company fallen in facing to the front and rear, also in file turned right or left, under the Officer.

Saluting.—Passing the instructor at the attention with rifle at the slope.

Drill.—Turnings, &c., 3—4 men at a time in close order, judging the time. Dressing with one pace interval, 3—4 men simultaneously, on points and files. Rapidly covering on the right or left flank man, who is advanced a few paces.

Slow step in one motion with the left arm behind the back, and also with both arms at the side; the more advanced recruits with the rifle at the slope. Quick step (114 per minute). Turning and fronting on the march. Occasionally the whole squad must pass the instructor in single file, 15 paces distance being maintained between each individual.

Manual Exercise.—Sloping and ordering arms in 3 and 2 motions. At the close of the week, judging the time.

Aiming.—The lance-corporal acts as in the 4th week. The non-commissioned officer pays more attention to the position exercises.

Position Exercises.—The non-commissioned officer passes on to the position at the aiming-rest,¹ and at the same time makes the recruits load with

¹ The aiming-rest consists of a light vertical post about 4 feet high, to which is fastened at the top a flat cross-piece, about 5 feet long, 4 inches in depth, by $1\frac{1}{2}$ inches in thickness. This piece is not exactly perpendicular to the post, but rises from right to left at an angle of about 12 degrees with the horizontal plane. On the top edge of this cross-piece are cut thirty small notches, each about 2 inches long by 1 inch deep. These notches are numbered, so that the soldier can always remember the notch which best suits him in aiming from the rest. Each squad has one of these aiming-rests for its own use.—T.R.

dummy cartridges. Only the position, not the aiming, is to be checked. The trigger is not to be pressed, but care must be taken that the sights are kept upright.

Training for Extended Order Work.—Repeat what has been taught hitherto. The recruits will be practised in the open country in the various positions for firing, viz., standing, kneeling, lying down, behind thick and thin trees, behind earthworks, shelter trenches, and other objects. §§ 69—77, Part I, new German Drill Book.¹

Judging Distance.—50, 100, 150, 200 mètres to be marked out with banneroles. Soldiers (standing, kneeling, lying down) to be placed by them. The recruits must get a thorough idea of the distances first by the banneroles and afterwards by the men alongside. Apparent size of the men at the various distances, and distinctness with which they can be seen; explanation of the various influences which affect the vision. Transposing paces into mètres.

Gymnastics.—(a.) Jumping practice. As before.

(b.) Horizontal bar. First position for vaulting, with a run up to the bar. Bending and stretching each leg alternately when hanging from the bar; changing grip of the hands.

(c.) Horizontal beam. Turnings on it.

Bayonet v. Bayonet.—Nil.

Theoretical Instruction.—(a.) By the Officer. See last week.

(b.) By the non-commissioned officer. Same as last week.

Bugle Calls.—The general call.

The battalion call.

The four company calls.

General Remarks.—1. In the morning before the midday break the non-commissioned officer gives half an hour's physical training, a quarter of an hour's physical training with rifle, both by half-squads, then drill; in the afternoon one hour's gymnastics, then drill.

2. Seeing that the non-commissioned officer for the present and for some little time to come must devote himself particularly to position exercises, and also as experience teaches that the recruits lose ground in readiness in aiming, it appears necessary that he should occasionally during the week take the squad, especially such as are doubtful in aiming, to the tripods, and make them aim with the rifle resting on a sand-bag.

¹ Section 71 lays down: "For accuracy and comfort in aiming when lying down, it is especially important to get support for the rifle." At German manœuvres one constantly sees this precept carried into effect. A firing line, if checked in a position where no natural support for the rifle is obtainable, as in an open field, immediately proceeds to obtain it artificially. Every other man carries a small spade: while therefore his comrade keeps up the fire on the enemy, the man who has the spade throws up a small mound of earth in front of him in two or three minutes, or merely cuts out a few sods, which could not afford him effective cover, being intended only to act as a rest for his rifle. He then hands his spade to his comrade, and himself opens fire.

Sections 73, 74, 75 give directions for firing from behind thick or thin trees, breastworks, and add that the soldier is to be instructed in making use of walls, hedges, ditches, and even unimportant irregularities of ground to obtain cover and get a rest for the rifle. In firing from behind *thick* trees the left forearm is to be rested against the tree, while the palm of the left hand is to be pressed against the trunk of a *thin* tree, the rifle being supported between thumb and forefinger. The fact that the German soldier is taught to press his rifle to the shoulder as much with the right hand as with the left makes it possible for him to fire from such a position.

3. At the close of the week inspection of the squads in Position, in two ranks with intervals; dressing singly on points; marching individually; sloping and ordering individually; breasting the horizontal bar; "traveling" along the bar; bending and stretching the arms with hands resting on the bar; position standing without aiming or snapping.

6th Week.

Dress.—Drill order with helmet, chains up; afternoons with caps.

Physical Training.—Repeat groups 1—6 under the non-commissioned officer by squads. Recruits who are clumsy and backward must still be taken individually. Groups 7 and 8. The new practices individually at first, afterwards with 3—6 men at a time.

Physical Training with Rifle.—Repeat practices 1—4 with 6—8 men at a time. Practice 5 individually. Practice 3 of the position exercises.

Rallying.—As previously under the non-commissioned officers, with rifles at the slope. All the recruits of the company in column of sections by the right or left without rifles.

Drill.—Turnings singly with the rifle at the slope; 6—8 men at a time in touch without the rifle. Dressing as previously individually, and with 3—4 men at a time, sloping arms. Slow step in small parties with interval, turning and fronting on the march to be practised at the same time; slow step individually with rifle at slope, at same time turnings; quick step (114 per minute) individually without rifle with turnings, occasionally the whole squad in single file going past with 15 paces distance between individuals. The double individually with sloped arms. "Marching past" the instructor man by man without the rifle, heads being turned to the right.

Manual Exercise.—The Present in 2 motions, sloping from the Present in 3 motions. Sloping arms from the Order and *vice versâ*, judging the time, individually and also 2 or 3 men at a time.

Aiming.—The lance-corporal acts as in the 5th week. The non-commissioned officer devotes himself particularly to the position exercises.

Position Exercises.—The non-commissioned officer, after the recruit has learnt to load with dummy cartridges at the aiming-rest, teaches him the method of pressing the trigger, checking his aim being no object. Next comes snapping, a dummy cartridge being in the rifle,—position standing,—checking aim no object. The rifle should have some sort of support.

Training for Work in Extended Order.—Repeat and continue the different firing-positions with all sights. A man having been placed to represent an enemy, for the present at a short range, the non-commissioned officer must now show the recruit how to make use of the ground so as to get the fullest effect for his own fire, at the same time reducing the effects of the enemy's fire to a minimum. Further instruction in §§ 78—80, Part I, new German Drill Book.

Judging Distance.—The recruits must point out different objects, 50, 100, 150, and 200 mètres distant from any given point. The distance between these points must then be paced out, and the paces put into yards, or it can be measured with a tape.

Gymnastics.—(a.) Jumping practice. Repeat. The string is now raised a bit.

(b.) Horizontal bar. Repeat. With hands resting on the bar, and arms being kept straight, leg to be raised sideways till on a level with the bar. Also with hands resting on bar, taking one hand off and changing grip of hands. First motions in breasting the bar and passing one leg over it, with hands grasping the bar from both sides, *i.e.*, one hand reversed. Bar to be at height of man's shoulder.

(c.) Horizontal beam. Repeat.

Bayonet v. Bayonet Practice.—Nil.

Theoretical Instruction.—By Officer and non-commissioned officer. Same as 4th and 5th weeks.

*Bugle Calls.*¹—March (slow and quick step).

Halt.

Assemble.

Alarm.

Repeat all calls learnt hitherto.

General Remarks.—1. Mornings before the midday break, quarter of an hour's physical training, quarter of an hour's physical training with rifle, then drill. Afternoons, one hour's gymnastics, then drill.

2. From the middle of this week onwards greater stress is to be laid on the manual and firing exercises.

3. The non-commissioned officers report whether the recruits have sore feet or swollen legs.

4. At the close of the week the squads are inspected in sloping from the Order and *vice versa*; quick step (114 per minute) individually, with turnings without rifles, position standing at the rest with loading and snapping, aiming being no object; physical training, groups 1—6.

7th Week.

Dress.—As previously. Chains down. Afternoons, caps.

Physical Training.—All recruits of the company repeat groups 1—8 under the non-commissioned officers. Groups 9—10, being new practices, individually, afterwards 3—6 men at a time.

Physical Training with Rifle.—Repeat practices 1—5, inclusive, in the squad entire. Practice 6 individually. Position exercises with 3—6 men at a time.

Rallying.—As previously.

Saluting.—As previously. By squads with and without rifles.

Drill.—Repeat what has been taught. Turnings, &c., with sloped arms, 6—8 men at a time in close order. Dressing man by man on an alignment, perpendicular to the front, on points; also on alignments perpendicular or oblique to the proper front on files, with sloped arms. Slow step, with sloped arms, in small parties, with some interval between individuals. At the same time turnings and fronting on the march. Quick step (114 per minute) individually with sloped arms, with turnings and half turnings; marking time and changing step. Occasionally quick step (114), the whole squad passing the instructor in single file with sloped arms, 15 paces distance being kept between individuals; also the same practice with the head turned to the right. Marching in column of threes and fours, with greater distances between sections than the normal.

From the middle of the week onwards, passing instructor in slow time

¹ With regard to the bugle call for the "March," the new German Drill Book says: "If this call is sounded in usual time, troops step off at the quick; if sounded very quickly, they will double up. In the transport of troops by rail, it means that the men leave the carriages." Regarding the "Assemble" (in the open, in close order) it lays down: "If the battalion call is sounded before it, it means:—

"1. Alarm (most rapid assembly possible in full marching order on the alarm parades, or occupying specially ordered points).

"2. Conclusion of manœuvres for the time being (on which all troops without further delay march back to their billets or to any other place where they are to be quartered)."—TR.

with sloped arms by beat of the drum, head to the front, distances between individuals being maintained; also the same practice by half squads with intervals.

Manual and Firing Exercises.—The Present, and sloping from the Present, judging the time; sloping from the Order individually and ordering by half squads, judging the time. From the middle of the week onwards coming to the Ready from the Slope and loading rifle as a single-loader in five motions.

Aiming and Position Exercises.—The instruction in aiming, which has previously been given, is now repeated, attention being at the same time paid to a good position at the aiming-rest. The aim must be checked by means of auxiliary sights; at first aiming without pressing the trigger and releasing the spring, afterwards this also being done. Drawing in the breath to be practised.

Training for Work in Extended Order.—Movements of the separate groups under the group-leaders in broken ground, being opposed by a skeleton enemy. The Officer commences practising the men in fire discipline in the group.—New German Drill Book, Part I, §§ 133–142.¹

¹ The gist of these sections is as follows:—

§ 133. Firing on the move only to take place exceptionally.

§ 134. At drill, sights are to be most carefully set to distance ordered.

§ 135. The word of command to an extended line to be as short as possible, and to give first direction, then the object to be fired at, then the distance, and lastly the kind of fire.

Instance: (a) At the green hill top. Artillery! Sights 800 to 900! Ready! Present! Fire! Load!

(b) Right in front, extended line lying down! Sights 500! Independent firing.

§ 136. Ceasing fire on word of command or whistle sound, and recommencing on order "Continue fire!"

§ 137. Fire to be effective depends—

(a) On hitting;

(b) On concentrating fire.

Musketry regulations lay down size, &c., of objects to be fired at at various ranges, to get good results.

§ 138. Control of fire in action—

Zug-leader to keep the fire of his zug under his control as long as possible. Intervals to be kept between züge in firing line.

Zug-leader to keep two or three men who are good at judging distance near him.

Distance to prominent objects to be measured, if possible.

Otherwise use of map or simple judging distance recommended.

Frequently changing objects to be fired at to be avoided.

§ 139. Kinds of fire to be employed:—

Rapid fire.—Against objects which offer a good mark for a short time only, at short range.

Also against artillery at ranges over 800 mètres.

Volleys.—Best for keeping troops in hand and finding range. Impossible, however, to make voice heard by an extended line in the roar of battle. Can therefore only be employed at commencement of a fight, or when troops are not being fired at by enemy.

Independent firing therefore usual for an extended line. Men are more likely to hit. The leader, by first stopping fire by whistle sound, can order more rapid (or slower) firing! or magazine fire! as he thinks fit.

Slow firing is that no two men of a file have their rifles up at the same time. In rapid firing this does not matter.

§ 140. Fire discipline. This embraces the conscientious carrying out of all orders

Judging Distance.—Make the recruit pace up to a point, which he judges to be 25, 50, 100, 150, or 200 mètres from an object in the open country, or to be a certain distance from where he is standing, measured in a straight line. Pacing, turning paces into yards, or measuring the distance with a tape.

Gymnastics.—(a.) Jumping practice. Repeat. For jumping at a stand, string 20 inches high, with a run, 2 feet high.

(b.) Horizontal bar. Repeat. Grasping the bar from both sides (*i.e.*, one hand reversed), raise the chest to the bar and pass leg over it. Bar to be at the height of the shoulder.

(c.) Horizontal beam. Repeat.

(d.) Vertical rope. Swarming.

Bayonet v. Bayonet.—The fighting position without rifle, first in two motions with hips braced up; afterwards in one motion, without rifle. Explanation of the “fighting line.” Advancing and retreating one pace, without rifle.

Theoretical Instruction.—(a.) By the Officer, as in the 4th, 5th, 6th weeks.

(b.) By the non-commissioned officer.

(1.) How the soldier should conduct himself in marching to the rifle range. What his duty is on the range itself. (§ 25 German Musketry Regulations.)

(2.) Ammunition and targets (§ 8, *ibid.*).

*Bugle Calls.*¹—Attention.

The Alert.

Fix bayonets.

Commence firing.

Repeat all calls learnt previously.

General Remarks.—1. While the squads are at aiming and position exercises the Officer takes the opportunity of daily inspecting one squad in them. He must always pick out some particular point to check, *e.g.*, a proper grip with the right hand; pressing the trigger and releasing the spring; making the recruits aim at his eye, &c., &c.

given to the firing line in the course of the fight, also the most exact observance of the regulations regarding the use of the rifle and the man's conduct in action. Fire discipline further demands steadiness under hostile fire, even though it must not at the moment be replied to, care in firing each shot, and skilful use of the ground to increase the effect of one's own fire. It also requires that the man's attention should be constantly given both to the leader and to the enemy, and that the man should at once cease firing on his leader sounding his whistle, or on his getting the order to do so in any other way.

Fire discipline must by training so become a second nature in the man that he never loses its influence, even when in course of a fight complete control of the fire by the leader becomes impossible, and when finally nothing remains to guide the conduct of the firing line but each man's own judgment, or the example set by particularly brave and judicious soldiers. In order to create and keep alive in the man self-reliance he must be made accustomed to circumstances in action, when all control of the firing has ceased, and he must be taught how to act in such circumstances.

§ 141. Observing the effect of fire.

§ 142. Re-formation of an extended line.

¹ With regard to the meaning of the call which is here translated the “Attention,” the German Drill Book says: “During the transport of men by rail the men enter the carriages; on the march they close to the side of the road to clear the way.”

“Commence firing is only to be employed on the range to warn the markers that firing is about to commence.”—TR.

2. In order to thoroughly check the aiming of the recruits it is necessary that the non-commissioned officers should have auxiliary sights with them, which they must always use.¹

3. From this time on the physical training is to be carried out by the non-commissioned officers going through, with all the recruits of the company fallen in, all leg, hip, arm, and head exercises, in turns, the exercises for each separate part of the body being now grouped.

4. At the close of the week, the squads are inspected in the Present and in sloping arms. Individual marching with sloped rifle, head to the front. Position standing without rest, including loading and snapping, the auxiliary sights not being employed. Rallying. Physical training, groups 6—8 inclusive; physical training with rifle with both arms, practices 1—5, and the position exercises. At the horizontal bar, taking hand off the bar and changing grip, when the hands are resting on the bar with arms straight; also the first motion in passing the knee over the bar from the position described above. (See 6th Week.)

8th Week.

Dress.—As hitherto.

Physical Training.—Repeat all the groups of exercises with the whole of the recruits of the company together, under the non-commissioned officers, one or two groups of exercises on each day.

Physical Training with Rifle.—Repeat practices 1—6 inclusive, and practice 7 by squads. Repeat position exercises by squads.

Rallying.—As previously under the non-commissioned officers. Also the recruits of the company do all formations, hitherto practised, collectively with rifles.

Saluting.—As previously.

Drill.—Turnings, &c., with sloped arms by squads in rank entire. The same practice with 2 files in close order. Dressing by squads in rank entire on points and on files. Individually passing instructor in quick time, with rifle at slope. Turnings and fronting on the march; half-turns; marking time and changing step. The whole squad marching past the instructor in single file, 15 paces distance between man and man, with head turned to the right. Squad marching to the front in slow and quick time, in single rank with intervals, to the beat of the drum, heads to the front.

Manual Exercise.—Coming to the Ready position and loading from the Slope, in five motions. End of the week, Ready, Present, return to Ready, firing, loading without looking at breech, putting rifle at safety, &c. Practise unloading. (New German Drill Book, Part I, §38.)

Aiming and Position Exercises.—Recruits aim, standing without rest, being checked by means of auxiliary sights, at first without pressing trigger and releasing the spring, afterwards doing so. (Eye to remain fixed on the object.)

Footnote adds: "To prevent losing time by fixing the auxiliary sights on every rifle in turn, the non-commissioned officer should make use of one only, to which they can be accurately fitted."

The recruits are instructed in method of signalling hits.

The musketry non-commissioned officer of the company begins practising the recruits in firing with "aiming-ammunition"² from the aiming-rest, auxiliary sights being screwed on.

¹ A particular form of auxiliary sights, called the "Brunn'sche Spiegelapparat," to be had of the Büchsenmacher Thurath of Stettin, is particularly recommended.

² "Aiming-ammunition" corresponds to our Morris tube. It is simply an ordinary cartridge-case with a cardboard cylinder about 1 inch long, containing a

Training for Work in Extended Order.—Repeat what has gone before. Movements as a “zug,” under the Officer, the group-leaders being in their places, in different kinds of ground against a skeleton enemy. Taking advantage of the ground, if not too damp; raising sights, fire discipline, stopping the firing by the whistle; attack, defence, and retiring to be thoroughly practised.

Judging Distance.—Judging distance in most varied ground up to 200 metres by dividing the required distance into equal portions, one of which can be judged with accuracy, or if preferable by finding lateral points to go by.

Gymnastics.—(a.) Jumping practice. Repeat. Jumping at a stand over 20 inches, with a run over 26 inches.

(b.) Horizontal bar. With hands resting on the bar and arms stiff, raising the body to a horizontal position over the bar. From passing the knee over bar, as before described, change to the “leg acting” position. Bar to be at the height of the shoulder.

(c.) Horizontal beam. Jumping off, when standing sideways.

(d.) Vertical rope. As before.

(e.) Plank ladder. Climbing, hand and foot on same side together.

Bayonet v. Bayonet.—Position with the rifle in two motions, afterwards in one. Explanation of fighting distance and unguarded points.

Theoretical Instruction.—(a.) By the Officer.

Education for work in extended order. Extended Order, new German Drill Book, Part I, §§ 67—80, 127—142. Also how the soldier should conduct himself in the fight, *ibid.*, Part II, §§ 57—61.

Footnote adds: “The Officer should sift out from the above only just so much as the soldier ought to know.”

(b.) By the non-commissioned officer.

1. Soldier's pay and allowances.

Footnote adds: “The non-commissioned officers will by this time have so thoroughly instructed their recruits in this matter on pay days, that the instruction in the pay, &c., cannot now present many difficulties.”

2. Subdivision of an army corps into Divisions and brigades. Repeat the subdivisions of the brigade downwards.

3. Houses of the immediate superiors and way to them; position of the different barracks, hospitals, offices, magazines, Government workshops, railway stations, and central post offices.

Footnote adds: “It is to be recommended that in every barrack room a nominal roll of all immediate superiors, especially of those who are stationed in the garrison, should be posted up, also a list of addresses and a plan of the town, on which the houses of the above as well as the military and public buildings are plainly marked.”

Bugle Calls.—Repeat all hitherto taught.

General Remarks.—1. Physical training, without and with the rifle, as well as position exercises, will be henceforward practised, as hitherto, under the non-commissioned officer, not in the gymnastic hour, on two days in the week only.

2. The Officer inspects each squad daily, either on falling in, or during the parade, in the Present and in Sloping arms, in order to ensure uniformity in the manual exercise.

3. The non-commissioned officers—never the lance-corporals—are in the future to pay particular attention to those recruits who are backward in drill,

small round bullet and some powder in rear, pushed into the top. The cylinder is closed at both ends with very thin paper, so that the charge is exploded by the cap of the cartridge-case. The bullet flies accurately up to about 20 paces.—Tr.

as well as to those who are weak in the manual exercises. Should other non-commissioned officers of the company on the days on which it does guards, &c., not be on duty, it is to be recommended that they should be temporarily told off to the recruits, to help on the more backward.

4. At the close of the week the squads are inspected in position with sloped arms in rank entire; marching singly with sloped arms, head turned to the right; the whole of the position drill with aiming and snapping at the aiming-rest; "pulling up" to the bar of all kinds, grasping the bar from both sides (*i.e.*, one hand reversed) raising the chest to the bar, then passing first the right leg, then the left leg over it. Physical training, groups 9 and 10.

5. Instruction of squads by non-commissioned officers. Lecture by the Officer on all that has been taught from the 4th to the 7th week.

9th Week.

Dress.—As hitherto.

Physical Training.—As hitherto. The whole of the groups are gone through by the recruits of the company collectively judging the time, taking the word from the Officer.

Physical Training with Rifle.—Repeat the practices with both arms 1—6 inclusive, by squads, also the position exercises. Practices with rifle for strengthening arm and wrist.

Rallying.—As hitherto under the non-commissioned officers. All the recruits of the company in company column, fronted and turned about, under the Officer.

Saluting.—As hitherto.

Drill.—Turnings, &c., individually to be repeated; the same in two ranks. Squads dressing in close order by the right and by the left on points and on files, on alignments perpendicular and oblique to the proper front. Passing the instructor individually as hitherto. The whole squad marching past the instructor in single file, distance of 10 paces between man and man, heads to the front, also turned to the right. Marching to the front, 2, 3, 4, 6 men together in close order. Squad, formed as a section in two ranks, marches by file, as practice for marching past, when the four squads of the company fall in together.

The squads are told off as sections in two ranks, and drill as sections, in preparation for drill when the squads are brought together, supposing that this is ordered.

The whole of the recruits of the company to march man by man past the Officer with 10 paces distance, in order that uniformity of pace, cadence, (a metronome being used), position of the body, and carrying the rifle may be checked.

Marching past in quick time by squads in single rank with intervals, at first eyes front, afterwards eyes right. The drums and regimental band play the squads past.

Manual and Rifle Exercises.—Loading, firing, returning to ready, and ceasing fire without filling the magazine, &c.; also the same practice two and three men together, shoulder to shoulder, afterwards in file.

From the middle of the week onwards, practice in loading, firing, &c., individually, with filling the magazine. Emptying the magazine to be practised.

Footnote adds: The fully trained soldier must be able to fill the magazine, and load his rifle in 25—30 seconds, and fire 18—21 well-aimed shots in the minute. Recruits, however, are only expected to load in 30—35 seconds, and fire 13—16 aimed shots in the minute.

Manual and firing exercises by squads in single and double rank on th

word of command, judging the time. Manual and firing exercises individually to be repeated.

Aiming and Position Exercises.—Firing with aiming-ammunition under the non-commissioned officer, auxiliary sights being used. The non-commissioned officers of the squads practise their men more especially in position at the rest, also in position standing without rest and kneeling, the auxiliary sights being always used. Especial attention must be given to those who aim badly; they are to be constantly taken to the tripods and their aim checked.

Training for Extended Order Work.—Repeat what has gone before. Formation of the company column. Should there not be sufficient files to give 3 züge, each with at least 2 groups of from 4—6 files, only 2 züge will be formed.

All movements in extended order, which have hitherto been practised by the zug, will be now repeated and gone through afresh by the company column.

Practice in bugle calls. "Rapid Advance," "Assemble," "The Alert," "Fix Bayonets," to be sounded.

Judging Distance.—Judging distance up to 200 yards on moving targets (the lance-corporals to be used in this capacity) in various positions, and at the same time, instruction in the independent use of the rifle.

Gymnastics.—(a.) Jumping practice. Repetition. Jumping, standing over string 20 inches high, and with a run over 2 feet 4 inches.

(b.) Horizontal bar. Repetition. Passing knee over bar from position before described, also right and left leg acting; the bar is to be at the height of the men's heads for this practice. Circling the bar, it being at the height of the shoulder.

(c.) Horizontal beam. Repeat.

(d.) Vertical rope. Repeat.

(e.) Plank ladder. Repeat.

(f.) Inclined ladder. Climbing the ladder with right hand and foot acting together. Hands to grasp the rungs, afterwards the sides of the ladder.

Bayonet v. Bayonet.—Repetition. Thrusts with rifle held firmly in both hands by motions, the pauses between the motions of thrusting and recovering being gradually lessened.

Theoretical Instruction.—(a.) By the Officer. As last week.

(b.) By the non-commissioned officer.

(1.) The different order, in which the soldier must turn out for different duties, parades, fatigues, roll-calls, for guard and orderly work, &c., also how the various uniforms in the soldier's possession must be worn.

(2.) Military obedience.

(3.) Military punishments.

(4.) Military decorations and rewards.

Bugle Calls.—So far as is necessary, all calls will be henceforward sounded during the week in varying order.

General Remarks.—1 Remarks 1, 2, and 3 of the 8th week again apply.

2. Experience teaches that recruits find much difficulty in manipulating the magazine rifle, while, during the short hours of drill, the time for practically training them in it must necessarily be very limited. It is therefore advisable to have already prepared them theoretically, as far as the institution of an hour of theoretical instruction occasionally, during the previous weeks, instead of the popular and customary cleaning and mending hour in the evening, will admit of this being done. During this hour, the non-commissioned officers of squads must by word of mouth, by illustrations, and by practical work with the magazine rifle, strive to stir the intelligence of the recruits.

3. The Officer inspects carefully each individual in coming to the Ready from the Slope, and the squad in single rank, coming to the Ready from the Order, judging the time.

4. At the close of the week the squads are inspected in : presenting arms ; loading in motions also judging the time, without filling the magazine—the above individually ; in turnings, &c. ; dressing by squads in close order on points and files ; rallying ; piling arms ; resting the hands on the horizontal bar, and keeping the arms straight, raising the body horizontally over the bar ; right and left leg acting on the bar ; physical training with rifle with both arms ; aiming and snapping in standing position without rest ; the instruction, which has been given by the non-commissioned officers.

10th Week.

Dress.—As hitherto.

Physical Training.—As hitherto.

Physical Training with Rifle.—Repeat all that has been taught up to present. Also practices 1 and 2 with one arm individually. Group 1 of practices with both arms.

Rallying.—Only now for the recruits of the company collectively under the Officer. Squads fall in in two ranks in company column by the right or left. The rallying now takes place only on the word of command being given : “Fall in, Double—March,” or on the Assemble being sounded.

Saluting.—Repeat.

Garrison Guard Duty.—Practise guard mounting and dismounting.

Drill.—Turnings, dressing as hitherto, also by advancing or retiring three centre files at the double ; individual marching, &c., as hitherto, by squads in single file with heads turned to the right, 8 paces distance being kept between man and man. Marching to the front by squads as hitherto. Marching by files, with heads turned to the right, as a preparation for the march-past in the zug ; the same practice at the double. The whole of the recruits of the company pass the instructor singly to gain uniformity in pace, cadence, position of the body, and carrying the rifle—8 paces distance between man and man. Marching past in quick time by squads in single rank with intervals, heads at first straight to the front, afterwards turned to the right ; same practice at the double, the drums and regimental band playing them past. Go through the formation in which the recruits will be drawn up for the inspection.

Drill by sections ; wheeling by sections, turning into file, forming to the front on the march. Drill with all the recruits of the company collectively to be commenced ; manual and firing exercises and file marching.

Manual and Firing Exercises.—Repeat the whole of the manual and firing exercises individually and by squads ; bringing the rifle down for the charge and fixing the bayonet ; loading individually when on the move from the Slope, also with filling the magazine. Manual and firing exercises with all recruits of company fallen in, the same as a rear rank.

Aiming and Position Exercises.—Shooting with aiming-ammunition from the rest under the company musketry non-commissioned officer as hitherto. The non-commissioned officers of squads continue the same aiming practices as hitherto and check, by means of auxiliary sights, the recruits firing with blank from the rest. Position standing without rest, also holding rifle to shoulder with one hand only, to be continually practised. Positions kneeling and lying down with rifle to the shoulder and leaf of the backsight raised, auxiliary sights also being employed. If weather be fine, ball practice will be commenced.

Training for Extended Order Work.—Continuation of work in company column. with special reference to §§ 187—195, Part I, new Drill Book.

The more advanced training of men in extended order work, as laid down in the Musketry Regulations, is now to be commenced (§ 36, Musketry Regulations).

Gymnastics—(a.) Jumping practice. Repeat.

(b.) Horizontal bar. Repeat. Throwing leg over bar with hands reversed. Bar at height of man's shoulder.

(c.) Horizontal beam. Repeat.

(d.) Vertical rope. Repeat.

(e.) Plank ladder. Repeat.

(f.) Inclined ladder. Repeat.

Bayonet v. Bayonet.—Repetition. Thrusts with rifle held firmly in both hands, by numbers.

Theoretical Instruction.—(a.) By the Officer. (Same as 8th and 9th weeks.)

(b.) By the non-commissioned officer.

- (1.) The soldier on detachment, as orderly, as member of court-martial,¹ also as witness.
- (2.) Garrison guard duty. Objects of guards and sentries. Superior Officers. Dress on guard. What the soldier ought to know concerning relieving guards and sentries.
- (3.) Repeat parts of previous instruction.

Bugle Calls.—See 9th week.

General Remarks.—1. See general remarks 1, 2, and 3 of the 8th week.

2. The Officer inspects the men daily in the same formation in which they will be drawn up for the company inspection, also dressed by the left. He also inspects the squads in turns with rifles at the Slope, at the Present, and at the Ready. The manual and firing exercises by squads individually.

3. Every day at the close of the morning parade, marching to the front and marching past with drums and band.

4. The manual and firing exercises are now to be repeated most energetically, as in practising loading and firing from the magazine the position of the upper part of the body will have suffered, this being especially the case with clumsy and weakly recruits.

5. Only those recruits are to be taken to ball practice who have fulfilled at least twice the conditions of the 3rd class with aiming ammunition.

Footnote adds: "The Officer must, as far as possible, have seen each individual man fire with aiming-ammunition, before he allows him to go to the range to fire with ball.

6. At the close of the week the squads are inspected in the following: as drawn up for the company inspection; individual marching; position with rifle at Slope, Present, &c.; loading, firing, coming to the Order from Ready, filling the magazine, and using the rifle as a single-loader, then as repeater, and *vice versa*—individually by word of command; turnings, &c., dressing by squads; physical training, all the recruits of the company together, taking the word from the Officer; first three practices of the position exercises and wrist exercises with the rifle under the non-commissioned officers; circling the bar with hands reversed; breasting the bar twice, also three times with hands reversed, and also with one hand reversed only; climbing practices at the ladders and rope.

¹ In Germany there are always two or three members who are of the same rank as the prisoner: thus a R.C.M. for the trial of a private consists of a Captain as President, 2 First Lieutenants, 2 Second Lieutenants, 2 under-officers, and 2 privates. Grierson, "Armed Strength of German Empire," Part II, p. 111.—Tr.

Inspection of the squads in firing with blank and aiming-ammunition from the rest.

Lecture by Officer on theoretical instruction of weeks 8—10.

11th Week.

Dress.—As hitherto.

Physical Training.—As hitherto.

Physical Training with Rifle.—Repetition of what has hitherto been taught. Practice 1 and 2 of the exercises with one arm, by half squads ; practice 3, individually, then 3—6 men at a time. Group 2 of the physical training with rifle with both arms. The Officer takes all the recruits of the company together in the physical training with rifle with both arms and in the position exercises.

Rallying.—As hitherto.

Saluting.—Repeat, especially saluting without the rifle.

Garrison Guard Duty.—Repeat dismounting, &c., guards ; practise mounting and being relieved off sentry.

Drill.—Turnings, &c., as hitherto ; dressing as hitherto, and also turned about. Passing instructor in single file with 6 paces distance, and marching to the front as hitherto. All recruits of company going past in single file, with 6 paces distance to get uniformity of step, &c. ; marching to the front in double rank, heads to the front, to prepare for marching past in züge, also at the double. Marching past, as hitherto, with eyes right. Drilling in double rank ; wheeling, turning into file, forming to the front on the march ; breaking off files. All recruits of company drilling together ; manual and firing exercises, file-marching, dressing by right or left on points and files on a perpendicular or oblique alignment, also turned about, wheeling by sections, turning into file, forming to the front—if the latter movements are ordered. At the close of the week marching past as a zug, also at the double, with drums and band. Go through formation in which recruits will be drawn up for inspection, and thoroughly drill the squads in it.

Manual and Firing Exercises.—Individually, also by squads in single and double rank, and with all the recruits of the company collectively. Individual practice in rapid aimed firing, loading from the pouch without and with use of the magazine. Loading from the Order.

Aiming and Position Exercises.—Firing with blank, aiming, and ball ammunition. All firing positions, especially standing and lying down without a rest, are to be constantly repeated under the non-commissioned officers.

Training for Extended Order Work.—Continuation of practices in company column with reference to §§ 169—173 and §§ 180—186, Part I, new German Drill Book. At the same time raising leaf of backsight, all kinds of fire (e.g., slow, rapid, volley, independent, magazine), cease firing when using magazine, particularly to be practised.

The training of the men in extended order, according § 36, German Musketry Regulations, is, as far as the weather allows of it, to be continued over all sorts of ground up to 200 mètres.

Gymnastics.—(a.) Jumping practice. As hitherto.

(b.) Horizontal bar. Repeat. Throwing leg over the bar with hands reversed, bar at height of man's shoulder.

(c.) Horizontal beam.

(b.) Vertical rope.

(e.) Plank ladder.

(f.) Inclined ladder.

} Repeat.

Footnote adds : "The proper method of marching squads up to the various appliances must be paid attention to. The squads will be practised and inspected in this."

Bayonet v. Bayonet.—Repeat. Thrusts with rifle firmly held in both hands, judging the time.

Theoretical Instruction.—(a.) By the Officer.

The infantry rifle, model 71/84, and its manipulation. Revisal of separate courses of instruction, given by non-commissioned officers.

Footnote adds : "The Officer in charge of the recruits must at the inspection show that he is completely master not only of what he has himself had to lecture on, but also of what the non-commissioned officers have had to instruct the men in. It is therefore necessary that he should occasionally go through with the recruits, in order to get in perfect touch with them, one of the non-commissioned officer's themes for instruction."

(b.) By the non-commissioned officer.

(1.) Garrison guard duty. What the man ought to know of relieving guards and sentries. Duties on sentry.

(2.) Repeat parts of earlier instruction.

Bugle Calls.—See 9th week.

General Remarks.—1. See 1, 2, 3, of 8th week, and 2, 3, 4 of 10th week.

2. Firing with ball will be only so far continued, that fresh attempts will be made to bring on recruits who have not yet fulfilled the 1st practice. Continual and sufficient preparation of these recruits under the company musketry non-commissioned officer, with most thorough checking of their aiming by the Officer, is unconditionally necessary.

3. Every day the whole of the recruits march singly past the Officer, with absolutely correct distances and most accurate covering on the man in front. The Officer stands with the metronome in his hand.

4. At the close of the week the squads are inspected in bringing the rifle down for the charge ; fixing bayonets, manual and firing exercises individually, also in single and double rank judging the time ; included in above is loading as a front and rear rank man, with and without filling the magazine ; practices 1 and 2 of the physical training with rifle with one arm ; the whole of the practices at the horizontal bar.

Everything which will be done at the inspection must be repeatedly gone through from beginning to end. Attention must at the same time be given to the non-commissioned officers and lance-corporals, to see that they know what they have to do at the inspection. The Officer lectures on the instruction of the 11th week. Non-commissioned officers continue the instruction of the recruits.

12th Week.

Dress.—As hitherto ; during the latter days of the week the helmets which will be worn at the inspection will be frequently put on, and new slings will be fitted on the rifles for the manual and firing exercises.

Physical Training.—As hitherto.

Physical Training with Rifle.—Repeat all that has gone before, also practices with one arm with the addition of group 3 of the practices with both arms by squads ; the Officer also goes through the whole of the practices, with all the recruits of the company collectively.

Rallying.—As hitherto. Immediately after the rallying, all the recruits of the company fall in together and march past.

Saluting.—Repetition, especially without the rifle.

Garrison Guard Duty.—Repetition. Paying proper compliments when on sentry.

Drill.—Turnings, dressing of all kinds. Covering to be practised as before. Individual marching as hitherto, with eyes front and eyes right ; this is

especially to be gone through with all the recruits of the company fallen in in single file, with correct distance between man and man, as laid down for the inspection; each squad marching straight to the front in two ranks, as practice for marching past in the *zug*. All the recruits of the company double past one by one, with distance laid down for the inspection. Marching and doubling past by squads in rank entire, also all the recruits of the company in two ranks. Drums and band to play them past. Go through the programme for the inspection. Drill with all the recruits of the company fallen in, the non-commissioned officers, &c., being in their places in the supernumerary rank.

Manual and Firing Exercises.—Individually and by squads to be repeated. Also the exercises in single and double rank by squads, also all the recruits of the company in two ranks. Rapid fire, loading from the pouch, and also using the magazine to be practised with all recruits of company collectively.

Footnote adds: "Before the inspection all dummy cartridges must be examined to see that they can readily be loaded: this to prevent jamming when using the magazine."

Aiming and Position Exercises.—Firing with aiming, blank, and ball ammunition. All the firing positions to be constantly repeated under the non-commissioned officers.

Training for Extended Order Work.—Repeat. Great importance to be attached to a proper use of ground, the various kinds of fire, correctly fixing sights, rapidly ceasing fire, and to smartness and rapidity on the part of those extended. The practices to teach the individual soldier what to do (*e.g.*, what position to take for firing, what sight to use, on what part of an opponent, whether mounted, standing, kneeling, or lying down, to aim) if acting on his own responsibility in the fight, to be continued; up to 200 mètres, over varying ground, as far as the weather permits.

Gymnastics.—Go through all the practices which have been taught at the bar, beam, ladders, rope, in jumping, &c., which will be required at the inspection. The squads must be practised in mutually changing over from one set of appliances to another, without confusion.

Bayonet v. Bayonet.—Repeat.

Theoretical Instruction.—(a.) By the Officer.

Garrison guard duty. Arrests, manipulation of weapons. Revise former instruction, also separate courses of instruction, given by non-commissioned officers.

(b.) By the non-commissioned officers.

(1.) Garrison guard duty. Paying proper compliments as sentries. How guards act after dark. Officer of the day. Rounds and patrols.

(2.) Repeat parts of previous instruction.

Bugle Calls.—See 9th week.

General Remarks.—1. See general remarks 1, 2, and 3 of 8th week, 2, 3, 4 of 10th week, 2 of 11th week.

2. All the recruits of the company, fallen in together, take the word from the Officer in the manual and firing exercises, also in drilling. The squads are inspected in practice 3 of the physical training with rifle with one arm, and practices 1, 2, and 3 with both arms.

3. The Officer lectures on the theoretical instruction of the 12th week. The non-commissioned officers continue the instruction of the recruits.

NOTICES OF BOOKS.

[It is desirable to correct an error into which we fell in noticing in the last number of the Journal Captain Glünicke's translation of the New German Field Exercise. Captain Glünicke is right, not wrong, in saying that: "Accordingly a company of 100 men ought not to occupy a front of much more than 40 yards." This sentence does not, however, occur in the original, but is a deduction from a particular sentence for English use. Hence the mistake.—L. A. H.]

The Decisive Battles of India from 1746 to 1849 inclusive. New Edition. By Colonel G. B. MALLESON, C.S.I. London: Allen and Co., 1888. Pp. 470. Size $7\frac{3}{4}'' \times 5\frac{1}{4}'' \times 2\frac{1}{4}''$. Weight under $2\frac{1}{4}$ lbs. Price 7s. 6d.

This work has already been noticed in the Journal. The new edition is due, the author says, to the fact that two large editions have been exhausted, and the demand for it still continues. Under these circumstances he has been requested by the publishers to prepare for the press an edition which, from the smaller size and lesser price of the volume, shall bring it within reach of those who may hitherto have been deterred from reading it. We congratulate both the author and the publishers on their success.

Corazze e Torpediniere. Esame d'un Veterano sul Criterio degli Autori Antichi del Contre Ammiraglio F. V. ARMINGTON, Genova. Topografia del R. Istituto Sordo-Mute, 1888. Pamph. Pp. 131. Weight under 6 ozs.

A record of the changes introduced into naval warfare during the last twenty years, dealt with in a popular rather than a technical style.

Reise S.M. Scheffes "Albatros," über Commando des K.K. Fregkapitäns A. Müldner, nach Süd-Amerika, dem Caplande und West-Afrika, 1885-86. Verfasst von J. F. V. BENKO, Corp.-Kap. Pola, 1889. C. Gerolds' Sohn, in Wien. Pp. 463. Size $9'' \times 6'' \times \frac{3}{4}''$. Weight under 1 lb. 6 ozs.

A continuation of a series of voyages noticed from time to time in this Journal.

Memoir of Lieut. Rudolph de Lisle, R.N., of the Royal Naval Brigade on the Upper Nile. By the Rev. H. N. OXENHAM. Third Edition. London: Chapman and Hall, 1887. Pp. 297. Size $7\frac{1}{2}'' \times 5\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. 6 ozs. Price 7s. 6d.

A record of a brave sailor, a zealous Catholic, and a good man.

Two Scottish Soldiers: A Soldier of 1688 and Blenheim; A Soldier of the American Revolution; and a Jacobite Laird and his Forbears. By James FERGUSON. Aberdeen: D. Wyllie and Son, 1888. Pp. 162. Size $9'' \times 5\frac{3}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. 10 ozs. Price 6s. 6d.

In this book we find a number of very interesting details of military history of the past, and also of the breech-loader of the past.

Historical Record of the Eighty-Ninth (Princess Victoria's) Regiment. Compiled by Rowland BRINCKMAN, Captain and Adjutant R. I. Fusiliers. Chatham: Gale and Polden. Pp. 235. Size $7\frac{1}{2}'' \times 5'' \times 1''$. Weight under 1 lb. 2 ozs. Price 5s.

The publication of the Regimental Histories, authorized by the General Order of 1st January, 1836, was carried out only to a partial extent. Hence the history

of the 89th was never published by authority. Captain Brinckman has undertaken the work, and in this little volume has laid the foundation for a full record of the services of a regiment which, raised nearly 100 years ago, has taken part in many of our wars, and has gained renown therein.

Napoleon at St. Helena. By Barry Edward O'MEARA, his late Surgeon. In two vols. London: Richard Bentley and Son, 1888. Pp. 739. Size 9" x 6" x 4". Weight under 5¼ lbs. Price 30s.

The first edition of the work appeared in 1822, and we are told in a note by the publishers that when issued at that time by Messrs. Simpkin, Marshall, and Co., the interest excited by it was so great on the part of the public that the predecessors of the City police were called into requisition and posted round Stationers' Hall Court to keep off the crowd. Since the publication of the earlier editions several important works have appeared, such as *De Remusat* and *Metternich*, also the narrative of Baron Sturmer, and *The Life of Governor Lowe* by Forsyth. Considerable alterations and additions have been therefore made, and the bulk of the notes throughout the work are new.

Notes on Armour and the Artillery Defence of a Coast Fortress. By Major BUNBURY, R.A., Military Instructor, N.S.W. Sydney: C. Potter, 1888. Pp. 84. Size 9½" x 6" x ½". Weight under ¾ lb.

These notes are compiled for the use of the New South Wales Artillery. The author has endeavoured to ascertain the probable solution of the problem not yet submitted to practical test: an engagement between a modern powerful fleet and a modern first-class fortress, and to show how the results of the theories on the subject might be practically applied to the service of ordinary coast batteries, such as those existing in the Colonies. In the appendix he has given some illustrative examples of a very interesting character.

Messrs. Clowes and Sons have published a series of useful little manuals, drawn up by Captain Malton, in connection with the New Field Exercise. It comprises:—

A Manual for Majors and Adjutants on Drill and Manœuvres, with Shelter Trench Exercises, Funerals, Encampments, &c. Price 1s.

One on *Brigade Drill and Attack Formations.* Price 2s., post free.

A Key to Infantry Drill, 1889 (inscribed by permission to Lord Wolseley). Price 1s. 6d.

The Duties of Markers in Drill. Price 6d.

A 13th Edition of Sinnott's *Catechism on Infantry Drill, adapted to the Present Regulations, with Questions on Manœuvre and Miscellaneous Subjects.* Price 3s., post free.

From the same firm comes a similar little work, *Physical Drill with or without Arms, and the New Bayonet Exercise.* By Lieut.-Colonel G. M. Fox (dedicated to the Commander-in-Chief). Price 1s. And finally:

Method of Instructing a Company Practically on Parade in Company Drill. By Captain F. C. RICARDO, Grenadier Guards. Price 1s.

Of a similar character is a little work of 165 pages, from the pen of Captain H. R. GALL (published by W. H. Allen, London), entitled, *Tactical Questions and Answers on the Infantry Drill Book, 1889.* Price 1s. *Company Drill Made Easy.* By W. GORDON. Price 1s. 6d., or 15s. per dozen. And *Physical Training Made Easy.* Price 1s. The latter two being published by Messrs. Gale and Polden, of Chatham.

History of the Corps of Royal Engineers. By Major-General WHITWORTH PORTER, late R.E. London: Longmans, 1889. 2 vols. Pp. 1071. Size 9" x 6" x 3½". Weight under 4¾ lbs. Price 36s.

General Porter has made use of the leisure of a retired Officer to some purpose,

and has with a great expenditure of time and labour drawn up an admirable history of the corps in which he has served.

Internal Ballistics. By J. A. LONGRIDGE, M.Inst.C.E. London: Spon, 1889. Pp. 240. Size 9" × 6" × 1". Weight under 1 lb. 10 ozs. Price 18s.

The author deals in this book with Explosive Substances in general, Fired Gunpowder, M. Sarrau's Formulæ, Internal Ballistics in relation to Gun Construction, and Guns considered as Thermodynamic Machines. He maintains that theory and sound practice are not nor ever can be divergent, and his object is to assist in removing the incubus of empiricism from artillery science.

Gibraltar. By H. M. FIELD. London: Chapman and Hall, 1889. Pp. 139. Size 9" × 6" × 1". Weight under 1 lb. 10 ozs. Price 7s. 6d.

The book is the result of a visit of one of our American cousins to Gibraltar, but The Rock is such well-trodden ground, that any record of a visit to it now-a-days cannot reveal anything new.

Through the Heart of Asia over the Pamir to India. By GABRIEL BONVALOT, with 250 illustrations by ALBERT PEPIN. Translated from the French by C. B. PITMAN. London: Chapman and Hall, 1889. 2 vols. Pp. 530. Size 10½" × 7" × 2". Weight under 4 lbs. 8 ozs. Price 32s.

"I can see nothing calculated to check the advance of a people whose sources of energy and action are increasing each day, as its population grows, and as it gains confidence in its own strength and knows how to use it. Besides this, the Russians do not disseminate their forces any more than a tree does when it drops its fruit and sows its seed, and they are ever pushing forward the same frontier, so to speak, by the inward pressure of the sap. All this causes deep concern to those whom we encountered upon the other side of the mighty mountain chain." Such are some of the reflections of the travellers who, starting from Tiflis and proceeding by Meshed and Bokhara to Kokand, returned across the Pamir to Rawal Pindee.

Records of the Royal Horse Artillery from its Formation to the Present Time, being the revised edition of the *Records of the Horse Artillery.* London: Mitchell and Co., 1888. Pp. 277. Size 11" × 9½" × 1¼". Weight under 3½ lbs. Price 5s.

The original edition was the work of the late Major-General J. E. Mitchell, and the present one has been undertaken and carried through by his widow.

Les Méthodes de Guerre actuelles et vers la fin du XIXme Siècle. Par le Général PIERRON. 2e Ed. Tome Première. IIme Partie. Paris: Libraire Militaire de L. Baudoin, 1889. Pp. 774. Size 7½" × 5" × 1¾". Weight under 1 lb. 6 ozs. Price 6 fr. 30 c.

Nearly 800 pages of a most marvellous encyclopædia.

Charles George Gordon. By Colonel Sir WILLIAM F. BUTLER. London: Macmillan and Co., 1889. Pp. 255. Size 7½" × 5" × ¾". Weight under 1 lb. Price 2s. 6d.

This admirably written little book is an excellent introduction to the series of English Men of Action which began in February last, and will be continued monthly. Judging from the list of authors of the rest of the series the standard set up in the first volume will be maintained, but it is a high one.

Works on Horses and Equitation: A Bibliographical Record of Hippology. By F. H. HUTH. London: Quaritch, 1887. Pp. 429. Size 9" × 7" × 1½". Weight under 2½ lbs. Price 21s.

This is a very useful work, in the compilation of which Captain Huth has derived assistance from the notes on the subject drawn up by Captain Elliot. Some 4,000

works in many languages are arranged in order of publication from 430 B.C. to 1886 A.D. Besides this list is an index to names of authors and one to subjects. The book is one of very great value.

Rapid Field Sketching and Reconnaissance. By Captain W. VERNER, Rifle Brigade, D.A.A.G. for Instruction, S.E. District. London: Allen, 1889. Pp. 87. Size $10'' \times 6\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. 6 ozs. Price 7s. 6d.

Captain Verner has had a great deal of practical experience of this subject, and has given us a most readable and useful book in connection with it.

Roaring in Horses: Its History, Nature, Causes, Prevention, and Treatment. By G. FLEMING, C.B. London: Baillière, 1889. Pp. 160. Size $9'' \times 5\frac{1}{2}'' \times \frac{3}{4}''$. Weight under 1 lb. 2 ozs. Price 6s.

Coming from so high an authority as Mr. Fleming, this book will at once receive from all interested in horseflesh the attention it deserves.

The Journal

OF THE

Royal United Service Institution.

VOL. XXXIII.

1889.

No. 148.
(Extra Number.)

MILITARY PRIZE ESSAY.

“DISCIPLINE” : ITS IMPORTANCE TO AN ARMED FORCE AND THE BEST MEANS OF PROMOTING AND MAINTAINING IT.

By Captain J. F. DANIELL, R.M. Lt. Infantry.

“Respite Finem.”

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Conclusion.

THE idea expressed by the familiar word "discipline" is one which is of an exceedingly complex nature, and consequently very hard to define; in fact, if what may be called the leading features are dealt

with, and reduced to an exact definition, there are so many side issues which necessarily present themselves to the mind, that any terse and brief definition cannot fail to be more or less unsatisfactory. Like many other perfectly familiar ideas—of which everyone fancies that he has the true meaning—it will be found that to different people the word conveys in many ways a different meaning, according to the natural bias of their minds; and further, that a very common error is often made, and the result of discipline is confounded in the mind, and too often in practice, with discipline itself; so that from want of a true logical insight into the essential features of the matter, the effect is confused with the cause.

Nevertheless, under all the ideas of discipline, which would be expressed by various minds viewing the subject in different lights, there is to be found one strong point of resemblance, namely, an idea of conformity—conformity to some ideal, expressed or understood.

Now, important as it is that everyone should have a clear and definite understanding of the ideas they habitually express by their words, and, consequently, should clearly know what they mean when they speak of discipline, to no class is it more important to have a right understanding on this special point than to those engaged in the profession of arms, for on this depends the sound and healthy working of the whole of the complicated machinery of which each individual in the profession forms a part, and right ideas will infallibly lead to success and honour, just as surely as wrong ones will lead to disaster and disgrace.

“Discipline,” says a great military writer, “is made up of a number of very different qualities,”¹ and it is only by a proper appreciation of these qualities, and a due knowledge of their action and reaction upon one another, that a successful discipline can be obtained, and, when obtained, can be kept up; for this, like every other moral or physical quality, can only be maintained in a flourishing condition by constant exercise, and is one which is very prone to deteriorate unless carefully and judiciously watched and guarded.

Of course it is not intended to convey that the question is one of theory; it is, on the contrary, essentially one of practice; but every practice, even of the simplest kind, is more or less founded upon some theory, and theory becomes objectionable only when it is pushed out of its place, and instead of being used to preserve a just balance and produce a rational mode of action, is allowed to overbalance the scale and produce an absurdity.

“Those who have particular callings,” says Locke,² “ought to understand them; and it is no unreasonable proposal, nor impossible to be compassed, that they should think and reason right about their daily employment.”

Universal consent would be given to this opinion in every walk of life, and surely no less by soldiers than by others; and among all the minutiae of their daily employment upon which they are called upon

¹ Hamley: “Operations of War.”

² Locke: “Of the Conduct of the Understanding,” p. 29.

to "think and reason right," what more important and more constantly before the mind than this great one of discipline?

Taking the question, then, now simply as one of discipline in relation to an armed force, a consideration of it under this special point of view must take a middle course between the two extremes. On the one hand, a too rigid insistence on the mental view—that of the philosopher—must be avoided; and, on the other hand, a too rigid insistence on the physical view—that of the athlete.

Military discipline consists of a happy combination of these two views; and a just idea of their relative value, combined with a sound practical knowledge, is the foundation of a good system.

The nature of man being such as it is, he is swayed by two different and often contradictory forces—the mental and the physical; and no rules can be formed for his general guidance which solely take into account either of these forces to the exclusion of the other; for the result of any such one-sided rules must inevitably be that less is got out of the human machine than it is actually capable of; while a due combination of the two will utilize every available power, minimize waste, and produce a result the more perfect the more evenly balanced the different factors are. It is unnecessary to go into detail with regard to the various emotions to which man, by his nature, is subject, and to the counterbalancing, controlling, or directing of which discipline is directed; for, from a soldier's point of view, at any rate, they are familiar to all who have ever given any thought to the subject. On the one hand, discipline aims at overcoming fear, love of pleasure, indolence, and recklessness, with the view of bringing the whole nature under control; while on the other it aims at guiding and directing the more noble emotions of enthusiasm, patriotism, and devotion to a leader; so that these too may be brought into harmony with the general whole; and, above all, it aims at inspiring a strong sense of duty, to become, as it were, a second and inalienable nature.

Indeed, this latter quality may almost be said to include all the former, for if the many striking instances of the results of military discipline which history records are carefully studied, it will be found that the sense of duty carried out even to the disregard of every other feeling has been the mainspring of each and all of them, and if this has been so in the past there is no reason to suppose that it will be otherwise in the future.

Such a sense of duty as is required is no plant of a spontaneous growth, but must be carefully cultivated and tended, and to this end the means of promoting and maintaining discipline must be directed. The practical method of producing and maintaining this quality in the most perfect degree is the problem to be solved.

In a lecture delivered many years ago it was said that the whole interest of a soldier's work in peace-time centred in the development in each rank of an effective organic unity, and a power in an army of acting as one body, animated by one spirit,¹ and this describes what

¹ Lecture on the "Connection between the Ordinary Work of Soldiers in Peace-time and Warlike Efficiency," Maurice, 1873.

discipline has to do. This is the object to be aimed at, the development of an effective organic unity, and to this end all efforts must be directed.

Habit is as all the world knows a very strong motive power, and one which has in itself an innate faculty of increase of strength and energy. Habits, bad or good, once formed by the repetition of certain acts, or even mental processes, gradually become a part of the life of the individual, and, finally, are almost unconsciously obeyed. Of what vast importance it is then that in the case of a soldier care should be taken that the habits implanted in his nature in the ordinary everyday routine of his military life should be such as will increase his value when called upon to act in any, however humble a capacity, as one of a corporate body from which unanimity and uniformity are imperatively required.

It has to be borne in mind further that the requirements of the present day are something more than those of a past time, not so very many years distant. All that was ever demanded from a soldier is demanded still, and the development of military science makes yet further demands, but the progress of the age has also produced a class of soldier from whom more may justly be required. The private soldier of to-day is a very different sort of man from the private soldier of even thirty years ago, his mental qualifications are of a far higher order, he is better educated, has more respect for himself, and is altogether of a more independent character, by which is meant that he is more capable of acting alone, and far more capable of understanding the reasons why, under certain circumstances, he is required to act in certain ways.

Of course this development and progress has not been, and is not, without its dangers; where "organic unity" is required, individuality cannot be allowed to reign unchecked, consequently the problem of to-day is even a harder one than that of former years, for, recognizing an increased individuality, this quality has to be guided and controlled without being stifled.

In every profession, whatever it may be, the man who is engaged in it gradually forms habits and ways of thinking which conform to his profession, and consciously or unconsciously he lays up in his mind a store of rules, which will guide his action in various circumstances as they arise, and just in proportion as his actions are founded upon sound conclusions so will his practice be sound and right.

Skill in a profession is the instantaneous and almost unthinking adaptation of a physical to a mental process, and the more rapid and perfect the adaptation, the greater the skill. A musician who pauses even for a fraction of a second to think how a chord must be struck is but an imperfect performer, and in the profession of arms this principle especially holds good. A soldier cannot, and dare not in many instances, stop to consider the why and wherefore of his action, the action must be instantaneous, and yet it must be adapted to its end, consequently he must be so trained that right thought and right action are practically one and the same thing.

There is no subject perhaps on which we hear more than on this subject of discipline, and from the earliest days of our military life we have had the idea instilled into us till we say and think that discipline is the mainspring of the machine. True! but what is this discipline? Surely not merely the habit of obedience, though that is a great part of it, but something over and above this, a series of qualities of which obedience is the foundation, and which culminate in the subordination of every thought and feeling to the idea of duty.

We all start rightly; obedience we are told is the soldier's first duty, and we learn obedience, but are we not sometimes apt to think that it is not only the first but the whole duty of the soldier, and consequently we fall short of the perfection of training which all should endeavour to attain?

A "rigid disciplinarian" is a very familiar phrase, but too often it conveys a very misleading idea, the idea of one who rigidly enforces a penal code. This is without doubt a necessary part of what is wanted, but it is not all, it is a means, not an end, and discipline in its complete sense means a great deal more than this, and requires much greater exertion on the part of the disciplinarian as well as on the part of the disciplined.

Enough has now been said on the subject generally to exhibit the manifold and complex nature of the quality we wish to obtain, and to give equal prominence both to the mental and physical aspect, so that, having the objective clearly in view, the subject may be dealt with in a practical manner by consideration of the existing means of promoting and maintaining discipline, and how far they are adapted to the desired end, as well as of the ordinary causes which militate against it and how far they may be counteracted. First, however, the importance of discipline to an armed force must be dealt with.

Importance of Discipline to an Armed Force.

This is a point which it is hardly possible to exaggerate or insist upon too strongly. To realize it, one need only glance at the military history of past years, where nearly every page brings out more or less either positively or negatively the value of habits of discipline, and the exceeding danger of the want of such habits. The organic unity which is needed for the ordinary routine of peace becomes ten-fold more necessary in the theatre of war when such mighty issues depend upon the perfection of each smallest link in the chain. In peace-time a laxity of discipline will cause inconvenience, annoyance, and a good deal of extra trouble to everyone concerned; in war-time it will cause disaster and ruin.

To troops whose discipline is imperfect either victory or defeat will be equally dangerous, in either case they will get out of hand, and the unity of the military machine will be gone; to those whose discipline is thoroughly good, difficulties become light, and the apparently impossible becomes the possible.

A very striking instance of the former case is afforded by the

retreat of Marshal MacMahon's army after the defeat at Woerth in the campaign of 1870; discipline was weak, and as a result, within a very few days of the commencement of a war, two army corps were for the time being practically out of the question, so far as offering any resistance to an advancing invader was concerned.

General Hamley points out clearly how this affected the campaign, for it could hardly have been conceived, indeed it was not conceived by the Germans, that MacMahon could be so pushed out of the theatre of war, and his troops so demoralized, that for nine days they were unable to exercise any influence on the operations.¹ Now there must have been some cause for this, and the cause will be found in a great measure inherent from the very outset, in the conduct of the French. Organization was bad, and what is organization but a test of discipline? Orders and counter-orders followed one another in rapid succession; co-operation between corps which had been intended never came to pass; the probable course of events had not been duly estimated, and unexpected occurrences caused alarm, alarm grew to panic, and so came about the lamentable spectacle of an army, a part of which had scarcely struck a blow, utterly demoralized, and for the time being ineffective and powerless.

The men had lost confidence in themselves and their leaders, and with confidence gone, the remnants of discipline quickly followed. Now it may be said that this was attributable to the commanders and to the faulty system, and so is a question rather outside that under consideration, but the principle contended for is the same for all ranks, and if the high sense of duty, with all that it involves, is present throughout an army, mistakes will not be so disastrous nor misfortune so overwhelming as in the case in point.

Laying aside, however, the case of the higher commanders and the errors of the system, and considering merely that of the mass of the army from the point of view of discipline, there certainly was not present that spirit which should exist in an armed force, and, as has been said, this is in a great measure seen from the very commencement of the struggle. All the false and noisy excitement which was displayed during the preliminary period boded ill for the future, should not everything go smoothly, and very soon the froth and bubble was gone, and for the time there was nothing to take its place, for the lesson had not then been fully learnt.

Confidence and enthusiasm, if based upon a sure foundation, are excellent and invaluable aids to discipline and consequent success, but the right spirit must be underlying them, the spirit which is formed by rigid training, which sees the problem, grasps the difficulty, and is nerved to meet it with a manly determination to succeed; for if based upon other grounds, if merely the echo of the cry of the many-tongued populace concealing ignorance or unpreparedness, they are indeed but the fabric of a house built upon the sand.

The following picture of the camp at Chalons, about the 17th August, 1870, and of the men who went to join it, is instructive.

¹ Hamley: "Operations of War," p. 326.

A French Officer ordered to the camp travelled from Paris in a train crowded with detachments of all arms, and this is his description of his journey.¹ "The behaviour of the troops conveyed by the train was deplorable. It was impossible to induce them to remain quietly in their seats; over-excited by the copious libations in which they had indulged before starting, and which were supplemented by the relays of drink they had brought with them, impatient, too, as all travellers are, by reason of continual stoppages, uncomfortable carriages, and a snail's rate of progressing, they rushed to and fro, piled themselves up in the same compartment, made excursions on the baggage-trucks, along the footboards, tore their uniforms, &c." While all this was going on, he says that "the Officers dared not say a word, or if they did open their mouths they gave the word of command with that timidity which is so sure a sign of a defeated and demoralized army, and of leaders who are reduced to endeavour by dint of platitudes to gain the forgiveness of their inferiors for hardships borne in vain and battles unskilfully fought."

On arrival at Chalons he thus describes the scene: "Disorder reigned supreme in the camp, which appeared as if it were given over to pillage; . . . instead of begilt Generals there were Commanders in dirty uniforms, who seemed afraid of showing themselves to their men. Instead of the fine regiments of other days, there was a mass of beings without discipline, cohesion, or rank—the swarm of dirty unarmed soldiers known as the *isolés*. There outside the tents and huts—there was no room for them inside—squatting or lying round the bivouac fires without any regular telling off, without arms, and with their uniform in threads, were the *isolés* of MacMahon, the fugitives from Reichshoffen, the remnants of regiments overwhelmed and dispersed by defeat; soldiers of the line without rifles or ammunition pouches, Zouaves in drawers, Turcos without turbans, dragoons without helmets, cuirassiers without cuirasses, hussars without sabretaches."

This is a picture of troops without the cohesion which discipline imparts, reduced to a mere rabble by defeat and disorderly retreat.

Instances might be multiplied: the surprise of the 5th French Corps at Beaumont is almost impossible to understand on tactical grounds, the most cursory inspection of the ground at this place shows how very much might have been done to hinder and delay the German advance, but apparently nothing was done at all, the enemy was allowed to traverse unopposed the difficult and intersected ground where he was restricted to certain definite lines of advance, and to open fire at close range on the luckless camp in the hollow south of Beaumont. It is impossible to believe that this disaster was caused by want of tactical skill, for the problem before the Commander was such an elementary one; the reason must be sought in the utter state of demoralization into which the corps had fallen, where the bonds of discipline were not strong enough to enable even the most

¹ "Journal of a Staff Officer in Paris during the events of 1870-71," Comte d'Herisson, pp. 17, 18.

ordinary duties incumbent on an army in the face of an enemy to be carried out.

In a note to Colonel Graham's translation from "The Tactical Deductions from the War of 1870," there is a characteristic anecdote which well illustrates the point under discussion.¹

"Two companies which had been separated from the 6th Corps chanced to meet the head of the 10th (German) Division. Although their retreat was not cut off, they made signs that they surrendered. By chance some men fired into them, upon which they took to flight. But the two Captains came over to us and surrendered, saying—*'Il n'y a plus rien à faire avec cette canaille là.'*"

Again, a French prisoner after Sedan told Captain Boguslawski, with an expression of intense disgust, "*Nos chefs ce sont des canailles. Ils m'ont défendu de manger une pomme.*"² Now about these two instances—they express both on the part of the Officers and the men a state of feeling which is exactly what ought not to exist, and show a lack of that mutual confidence between Officers and men which is all essential.

But to turn to a brighter side. What but the right sort of discipline long made the English line the admiration and dread of their foes in massive columns, which kept the thin squares at Waterloo firm against the repeated onslaughts of the French Cuirassiers, which carried our little force through all the horrors of the Crimean winter, and the wearisome and depressing work in the trenches? Poorly clad and scantily fed, that grand principle "of getting duty done as duty"³ carried them through it all; and in recent years the same principle has brought them through the toil under an Eastern sun, against the cataracts of the Nile, through the long hot march across the Bayuda Desert, a little handful surrounded by hordes of warlike tribesmen, through long trying months of inaction in the enervating climate of the Soudan, and will we hope and believe again bring them through any other trial of courage and endurance which they may be called upon to undergo.

In the actual stress of battle the all-absorbing struggle for life will keep men braced up to their task, but when the blood is warmed with no keen excitement, when the frame is wearied with long marches, and the mind with uncertainty as to what may happen, then it is that a good discipline makes itself evident more than at other times, and then must a leader feel that on the existence of it all depends.

Necessary as it is to preserve discipline during the fight, it is more necessary still in all those multifarious operations of war which culminate in the battle. When the bullets are actually whistling round them, there are many feelings which carry men on to their goal. In the excitement and tension of the nerves attendant on such moments, with some the innate savagery of human nature wakes up

¹ "Tactical Deductions from the War of 1870-71," Boguslawski, p. 70.

² *Ibid.*

³ "Connection between the Ordinary Work of Soldiers in Peace-time and War-like Efficiency," Maurice, 1873.

and overbalances other feelings, with others the positive knowledge that the forward path is the safer, all tend to make men go on; but when the din of battle is not raging, when each man has full consciousness of fatigue, hunger, and uncertainty, then there is no other feeling to keep him up but that stern sense of duty as duty, in other words a sense of discipline.

Yet again there is another time when this is all-important, namely, in the moment of victory, and this for two reasons, firstly, a tactical one, lest, when the cohesion of the attacking force has been lost, as inevitably it will be lost in the assault, and the reserves, perhaps, swallowed up to give weight to the decisive stroke, the enemy should be able, by a dexterous counterstroke from fresh troops, to turn the tide of battle and roll back the victors in confusion: secondly, a moral one, lest when the position is carried and the enemy is in retreat, the savage spirit which may have been roused in the attack should lead individuals to commit acts which in cooler moments they would shrink from, and which may stain the lustre of the country's arms. Those who have had experience of battle-fields will not be insensible to the importance of a very strict sense of discipline at this critical moment.

The necessity of discipline during retreat has been sufficiently shown by the example above quoted of what MacMahon's Army was without it, in its retreat from Woerth, but the case may be further strengthened by an example which tells in the other way, namely, the wonderful manner in which the Grand Army in its retreat from Moscow, though beset by every conceivable disadvantage, effected the passage of the Beresina in the presence of the enemy.¹

In spite of the hardships and privations which this army had undergone, and the dispiriting sense of the failure of their enterprise under which they must have been labouring, there was that spirit alive in them which enabled them to perform this great feat of skill and endurance, which certainly could never have been carried to a successful issue had not their sense of discipline been strong enough to survive the shocks to which it had been exposed, and to make them remember that though misfortune had come heavily upon them they were soldiers still, and the conditions of duty were in no wise altered.

There is one more remarkable though well-worn instance of the power of discipline in the field which may well be quoted here, as it refers to another set of circumstances, namely, those of the borderland between the march and the battle, when the troops have felt the enemy, and can see their objective, but are yet hardly in the fight, and this is the instance of the attack of the Prussian Guard against St. Privat. This attack teaches two lessons on this subject arising from one and the self-same set of actions.

The incident has formed the matter for so much thought and study on the part of students of military history; so many masters of the art of war have commented upon it, that it has been as it were dissected

¹ "Minor Tactics," Clery.

and laid bare for anatomical consideration by those who would learn how battles are won. One point seems to be brought out quite clearly, and that is that the attack was premature, and was not in perfect conformity with the general design at the time it took place. This is, perhaps, not the only instance in the Battle of Gravelotte to which this remark equally applies, but it is sufficient for the present purpose to consider this one case.

"Perhaps the Army," says Colonel Home,¹ "did not expect more from the Guard than from other corps, but the Guard most certainly did, and a certain feeling of regret that they had not been engaged undoubtedly was felt throughout this body." Now, if this be the case, here, as he points out, is a glimpse of the reason which led to the premature judgment "that the enemy had been sufficiently shaken to risk an attack across the open and gently ascending ground."² In other words, the Guard wanted to be in the fight, and into it they went with a gallantry and pluck which is beyond all praise. But was it strict discipline? Ought a Commander to be at all led, even by such a laudable motive, when the time is not ripe for action?

Of course he cannot, and must not be a mere machine to abide strictly and undeviatingly by the letter of his instructions if the circumstances change, but in this case they had not changed.

In a lecture recently delivered by an Officer who is familiar with every minutest event of the Campaign of 1870, this point is very trenchantly dealt with when he says that steps must be taken to prevent such events as the Guard entering the battle of Gravelotte without orders.³ Here is one of the lessons which the incident is quoted to illustrate—discipline is needed to keep a Commander from such enterprises as these, for however much we may glow with admiration at their gallantry, yet unnecessary loss of life is not for the good of the army nor of the country.

On the other hand, we can learn yet a further lesson; where would the Guard have been on that day unless the men, the rank and file, had been perfectly disciplined?

Launched up that gently sloping ascent between St. Marie aux Chênes and St. Privat, exposed in a close formation to the unceasing hail of bullets, unable for some time to produce any effect with their own weapons at the range at which they were, what kept them there at all, but discipline?

The cemetery on the top of the hill tells the story of this attack only too plainly; decimated though they were, yet the battalions held on, till after long waiting they could advance again, this time to be victorious, but at what cost! In short, the incident shows us plainly how necessary a rigid discipline is on the part of Commanders, so as not to allow them to risk their men unnecessarily, and on the part of all subordinates, so that they may cheerfully and steadily obey, in whatever position their Commander may have placed them.

¹ "Précis of Modern Tactics," Home, p. 76.

² Duke of Wurtemberg, quoted by Colonel Home: "Précis of Modern Tactics," p. 75.

³ Lecture delivered at Aldershot, 1888, Colonel Lonsdale Hale.

Fire Discipline.

We come now to a point to be dealt with which is one of the utmost importance, namely, Fire Discipline. It is important to consider this, not only because on the field of battle it is of such overwhelming moment, but also it is one which, unlike most of the other points which go to make up discipline, cannot well be perfected in peacetime, though no doubt a sound foundation can and ought to be laid, on which it will be safe to build in actual war; but since the result cannot be thoroughly and fairly judged, save by experience, we can never feel quite sure till we have tried, whether we have actually attained the object we wish for, so it is well to keep the problem constantly before our minds. Forewarned is forearmed, and if we are prepared for a difficulty which is almost certain to arise, we shall be the better prepared to meet it when it actually comes.

It must not, however, be forgotten that reasoning of this kind is very apt to degenerate into mere theorizing, which, as has been said, will, unless mingled with and tested by practice, produce no good result, so the only plan open to us is to consider what has been done by our own and other armies in this matter on the field, and to see how far it has been attended with satisfactory results.

This question of controlling fire on the battle-field is a most difficult one, a fact which is plainly enough shown, even by the experience of an ordinary field day. It is by no means easy to control fire, even when no bullets are flying about, and the difficulty is augmented a thousandfold when pretence has given way to reality, and when the careful husbanding of necessarily limited supplies of ammunition is a matter of vital importance.

As far as artillery are concerned, this question fortunately can from the nature of the case hardly arise. Even with breech-loading guns the time taken between each round is necessarily long enough to enable the Officers in charge of divisions to keep the fire well in hand, and also the longer ranges at which artillery will, as a rule, fight, makes the task of fire discipline comparatively easy. Even when, in the later stage of the action, artillery is pushed further on, still the nature of the arm is a salutary check, and also at that time extreme accuracy of fire is not so imperatively necessary; a case shot cannot well miss everything and everybody.

The question then is one which mainly concerns the infantry, and with this arm it enters intimately into their action at every period of the fight, from the longest to the shortest ranges.

Here we are met by a difficulty at the very outset; it is simply a truism to say that it is no good to teach men in peace to follow out a course of action which must be abandoned on the battle-field, such a proceeding at once does away with all idea of maintaining discipline by the formation of right habits, which will be followed out almost unthinkingly, and it is open to question whether we shall not place ourselves in some such predicament as this if we try to push too far the practice of volley-firing in peace manœuvres, without thoroughly

recognizing the circumstances of a modern battle, where after a time volley-firing will become almost if not quite an impossibility.

Of course, this method of firing is in the abstract the best and most obvious way of controlling fire, but the question is how far shall we be able to carry it out in practice?

The Campaign of 1866 tells us little on this head, for the enormous superiority of the Prussian breech-loader over the muzzle-loader of their opponents established for the former such an advantage from the outset that they were but little troubled by considerations of fire discipline. In the Franco-German War, however, the case was different, both armies had a breech-loading weapon, and this is what we learn from that campaign: "Neither French nor Germans ever succeeded in bringing troops in close order into the front line

. . . or in pushing battalions or companies forward to fire volleys."¹ Again, "the Prussians also found it impossible to make the least use of company or section volleys when engaged with infantry."² This is easily enough understood if the course of some typical action of the war, such as that of Woerth or Gravelotte, be taken, and closely studied. In the former, the battalions launched to the attack became gradually dissolved as they crossed the Sauer, and pushed across the low ground to the foot of the opposite hills, and there was indeed little opportunity for volley firing; battalions and companies were mixed up, little knots and groups pressed forward as they could, and no pause was practicable for a volley, even if an Officer could have made his voice heard above the din, to give the necessary orders.

In the latter action, there could have been but little chance for firing volleys among the throng of companies of different battalions and regiments which pressed round the farm of St. Hubert, or among the masses of troops which joined in the final assault on St. Privat at the other extremity of the line.

If only volleys could be fired at all times, no doubt they would be most effective, and it would be a practical method of solving, at any rate in part, the question of fire discipline, but French and German experience seems to say that they cannot be so fired, and if this be the case, it is no good to accustom men in peace to what they will never see in war, and we had better teach them when and how far volleys are practicable, recognizing that there will come a time when other fire must be used.

The increased range of the rifle has made fire practicable at long ranges, and the more highly trained the men are in shooting, the more use can be made of this increased power of the arm, so at these stages volleys can be employed, and with well-disciplined troops will be most useful, but it is not at this stage that the real difficulty of fire discipline has begun. Even here it is very doubtful whether anything on a larger scale than a half-company volley can be attempted, but later on when the opposing troops have pushed closer to one another, and the action begins to wax warm, then it is that

¹ "Tactical Deductions," Boguslawski, p. 79.

² *Ibid.*

the real difficulty begins, for the control of the fire will pass into the hands of the sectional commanders, and these are the men above all others, the subalterns, sergeants, and corporals, upon whom the question of fire discipline must be urged, and whom we must hammer away at till it has become a second nature to them to think of it.

In a book lately written, it is said with reference to a remark of General Skoboleff's that he could not urge too strongly on Commanders to have the fire of their men under control, that this is to be done by so "regularly, consistently, and persistently putting the soldier through the action of firing by orders that it shall be a second nature to him to fire his rifle only under control of his superior, and not otherwise;"¹ now, if this can be achieved the problem is solved, but the principle must not be pushed too far, so that the man will always wait for an order before firing, for this will not work in practice. It is all-important that the superior should thoroughly recognize his duty of controlling fire, but it will never do to lead the men to think that there will always be this superior to look to, in short much must be left to the man himself, and it is in fitting him for this necessary contingency that the control exercised by the superior should be directed. The above-quoted author says in another place, "the voice counts for nothing during the greater part of the struggle,"² and if this be true, as it undoubtedly is, it is no good teaching men always to look for orders, for in the din of battle they will not hear them when given, even if there be a superior on the spot to give them.

"When firing once begins men get easily out of hand, unless restrained by an iron discipline," says Prince Kraft.³ This is what is needed—this iron discipline, but surely this does not consist in merely obeying orders, in merely firing because the superior Officers order a man to fire; surely it is something far more deep-reaching, far harder to acquire, and Prince Kraft partly explains this in these words: "Not that formal obedience which consists in merely doing what you are told, and in awaiting orders, but that active obedience which leads a man to discover and anticipate the wishes of his superior."

This question more than any other is now engaging the attention of soldiers, and it is pretty generally admitted on all sides that the army which has the best fire discipline will be the victorious army of the future. The experience of the Germans in 1870 amply showed the necessity of fire discipline, and with their accustomed steady perseverance, and energetic use of the opportunity afforded by peace, they have diligently set this problem before themselves, and will no doubt effect a practical solution of this, as they have of so many other difficulties of military training.

If we would not be left behind in the race, we must with equal perseverance set about the same task, and there is plenty of evidence that we fully realize this fact.

For many years, we have seen old drill formations retained and

¹ "Common Sense on Parade," Colonel Macdonald, p. 118.

² *Ibid.*, p. 117.

³ *Ibid.*, p. 119.

steadily practised till they were performed with a mechanical precision; day by day, drill season after drill season, these time-honoured exercises have been gone through, the reason for them being stated to be that by such means the men were trained in habits of discipline. This was very true so far as it went, but it did not go far enough. Time was when this training was sufficient, but by degrees it has dawned on the minds of everyone that times are changing, and we must change too, that visions of shock tactics were getting dim and faint, and visions of fire tactics becoming clear and distinct and with them fire discipline.

We have certainly been loth to abandon our traditions, we have certainly not with rash haste hurried after any new thing, but the years of thought and experience have now borne fruit, and we stand in the dawn of another day.

We, like the Germans, have struck the pen through a multitude of manœuvres in the drill-book, some of which we were not long ago emphatically told "were as obsolete as the cross-bow,"¹ and we stand face to face with a new condition of things.

It has been suggested that a simplification of drill will shorten the necessary period of service, but this is far from being the case; the training of the soldier will take just as long as before, for the end to be gained is one harder of attainment, and the means adopted must be even more energetic. "Drill," as has recently been said, "is to be simplified to gain more time and opportunity for thorough individual training, and for more uniform and strict training of the men in fire discipline and the discipline of the combat, and this in future will be from a tactical point of view the test of a well-disciplined regiment."²

A German Officer lately lecturing at Berlin, after having had opportunities of seeing the working of British troops, said that in the English Army, when the attack commences, "all the outward germs of discipline are lost"³—now, if this be true, and most soldiers will in a greater or less degree admit the truth, it behoves us to consider the matter very seriously, as it will be universally allowed that we need to have both the spirit and the form, or to put it in another way, we can never in the field get the form unless it is dictated by the spirit.

It is impossible as has before been pointed out to lay down hard and fast rules, for there is no hard and fast standard by which rules can be adjusted, but as the matter is still, so to speak, *sub judice*, ideas concerning it must of necessity be in a great degree crude and tentative; it does seem, however, that what is wanted is to begin at the very root, and to employ the time allotted to training in impressing upon every single man, but above all upon Officers and non-commissioned officers, the value of fire, the way in which this value is multiplied tenfold by a cool and thinking use of it, and the importance of not just letting off a rifle, but of shooting so as to hit and to kill.

¹ Speech by Lord Wolseley.

² Lecture at Aldershot, 1888, Colonel Lonsdale Hale.

³ *Ibid.*

An Officer of experience has said that when once a man has found himself short of ammunition in a battle, he will take good care that it does not happen again; this is no doubt true, but we cannot run the risk of such a precarious way of teaching as this, a lesson so learnt is very likely to be the last as well as the first, so what we have got to do is to impress this point upon the men in peace.

Our musketry regulations are getting more and more practical, and it is to be hoped that they will yet go in the same direction, and that we shall one and all learn to take the same care of the men's shooting, either with ball or blank, which we have been heretofore accustomed to take with their dressing in line; thus by degrees we may hope to arrive at an improved fire discipline.

We have shaken ourselves free from the idea that shoulder-to-shoulder formations are essential for compactness and steadiness, a more extended order is that to which we have now turned our attention, and this practically means simply dealing with the unit—the individual soldier—instead of with the mass, the battalion or the company in close order. This is the principle which has to be applied to firing in order to obtain fire discipline, and necessary as the latter is now, the necessity will be even greater when men are armed with a magazine rifle.

Every Captain of a company must pay more and more attention to each individual man of his company; on parade, at the musketry range, and in the lecture-room, he must impress upon every man, and urge upon his subalterns and non-commissioned officers, this question of fire discipline. There are still some in the Service who look shyly upon the idea of a lecture-room, and declaim against theoretical soldiering; some small show of reason they certainly have, for soldiering is not and cannot be theoretical, it is eminently practical; but surely the vision of a lecture-room need not raise this bugbear of theory. A great surgeon is no theorist because he has spent hours in listening to lectures to learn the rudiments of his profession before he attempts to practise, a barrister is no theorist because he has spent perhaps years in studying intricate points of law before his voice is ever heard in a court of justice, and why should a soldier be a theorist because he has himself tried to grapple with, and to put clearly before others the many intricate problems which the profession of arms involves?

We still seem to have some lingering notion that a soldier, like a poet, is born and not made, but, as a matter of fact, probably for every one born soldier a thousand are made, and made by a persistent and lengthy process; the knowledge of war does not come by nature, it must be learned like everything else, and we want to realize that point. "Will, study, and perseverance," said Napoleon, "have made me what I am."

Our courses of military training have done much, but they might and they must do much more. If we take a book which someone else has compiled—a sort of patent military food, and oh, that well-meaning people would not write these books, which serve as crutches to the lame and a saving of trouble to the indolent!—and read it out

for half an hour to our men, because we have got to spend a certain amount of time each day, and a lecture must appear in the day's routine, what good does that do to anyone? If we are bored ourselves—and how can we be otherwise?—we shall certainly bore our audience, and for all the practical good we shall effect we might just as well not go through the pretence of the thing. It is not given to everyone to be a brilliant lecturer, nor is it needed in an Officer, but it is given to everyone who takes an interest in his profession to put in a concise and clear form to those under him some of the many points which all must grasp. An intelligent bricklayer will give a pretty clear if not strictly grammatical explanation of how he builds a wall, and why should we be behindhand and not be able, or, what is more probable, think that we are not able, to give a little clear explanation of the military art to our men?

If our trainings are used aright they may be a powerful aid in the acquirement of fire discipline, and the lecture-room will have a good deal to do with it.

Practically then let each Captain try to realize the problem himself, and to impress it upon his men, "constant dropping wears away the stone," and we shall not get what we want by a miracle or by any sudden inspiration on the part of ourselves or of our men, it will only be by a constant endeavour to implant the fact that a good soldier must have a cool head, a steady hand, and a deliberate aim at some special object. The real gravity of the situation, too, should be laid before the men; it is a serious thing to go with your life in your hand to meet probable death with a cheerful face and a stout heart, but they will not find it any the easier because they have not realized the situation till they are actually face to face with it, so it is just as well to put it plainly before them that there is difficulty, and there is danger, but that the spirit of duty, that is discipline, has to be raised and strengthened that the difficulty may be faced, the danger braved, and the object gained.

This has recently been clearly put in a lecture at Aldershot;¹ as an example, the case of two sons was taken who were going to fight their way in a distant Colony, and it was asked which of the two has the most chance of success, the one who has had put before him all the difficulties he is likely to encounter, or the other who goes out in ignorance and has to pick up his experience as he goes along? Surely the former has the better chance, he is better disciplined as we say, and it rests with every Officer to put his men in the position of one or the other of these imaginary colonists. Should there be a moment's hesitation as to which course we should adopt?

Now to apply what has been said to the case of the actual attack with a view to obtaining the necessary fire discipline. It must be presumed that no regiment will take the field without having undergone some such system of personal and individual instruction as has been indicated above, and there is one leading feature which must not be lost sight of, namely, that the Commander of a battalion can-

¹ Colonel Lonsdale Hale.

not be everywhere and do everything, he has his own proper sphere of action, and he cannot take the place of his Majors, Captains, and subalterns. It is no good his attempting to do so, and such an attempt will only lead to confusion; he must be content to let each individual Officer carry out his individual part of the battle.

We read that "after the storming of the Peiwar Kotal, the Officer commanding a regiment which took part in the flank attack stated that during a hard fight of several hours' duration he had never seen his regiment. In fact from the time he first launched it at the enemy until he rallied it again upon the position it had won, the whole conduct of the fight devolved upon the company Officers."¹ If then fire discipline is to be obtained it must be the company Officers who achieve this end.

Of late years, with improved and improving firearms, the different stages of a battle are not at all what they were, the effect of fire begins at a much greater range than formerly, and this is so far in our favour. In this early stage fire discipline may be rigid, for the men are still kept together, the noise is not too deafening, and the excitement of battle has not yet reached fever heat, so volleys are admissible, possible, and effective. Even here though these volleys will at most be only company or half company volleys, so at this stage the fight is beginning to be worked out by the company Officers. Then as the advance progresses, as bullets fall thick and fast, and many a gap appears in the ranks, excitement increases, the men want to fire rapidly, no matter whether they can see anything definite to fire at or not, and at once the Officers have a harder task, but still a good deal of control can be exercised if the Officers and men are accustomed to one another, and the tendency to fire wild must and can be checked. This will be all the easier if each man has had thoroughly impressed upon him that every shot which does not disable an enemy is not only wasted but actually adds to the risk of the man firing, by depriving him of ammunition which he will stand in urgent need of later on.

Then comes the other stage when the action is at its hottest, when the opposing troops are well in view, and then is the hardest task of all, a task, too, which will fall in a great measure on sectional leaders, and whenever an Officer or non-commissioned officer can then gather a group near him which can see him and look to him for guidance, he will exercise a very important influence on the fight; he may not be able to get a volley fired, but if he and the men have been well trained he will be able to exercise a salutary check upon their firing, and prevent waste of ammunition with its attendant risks. He will be able to ensure fire being delivered when and where it will be effective, in fact if each sectional leader will keep his head and use it he can do much in the way of control, and probably this is all he can be expected to do.

Experience hitherto does *not* tend to show that at this stage a Captain will be able to gather together a company or even a half company for a united volley.

¹ "Lectures on Tactics," Hart-Dyke.

To sum up, fire discipline means decentralization of authority, no superior can properly control more than four to eight subordinates, so let this be recognized and carried out through everything, and let each superior be allowed the control of this limited number; in all peace manoeuvres let this be the regular mode of progression, and so in war we shall be all the more prepared for what will be the existing conditions. Let every man have his own task, and see that he does it in peace, for often in battle it must be left entirely to him to do it without any one else to lean upon.

Each rank has quite enough to do if it does what is required of it, and the Commander cannot do the Captain's work, nor the Captain the subalterns', and so on to the last link in the chain. Decentralize authority, educate individuals in peace with the greatest care that they may know their duty, and in action let them do it.

Giving of Orders.

The next point to be considered is discipline mainly from an administrative point of view. Although, of course, the object of all discipline is tactical efficiency, yet the various parts of the machinery employed in training troops in peace, which are not immediately and directly connected with their tactical handling in the field, can be included under this general heading of discipline for administrative purposes. Here, as first in importance, as well as underlying very nearly every aspect of the subject, will be first considered the giving of orders.

Now if we want to get discipline, the relation between giving an order and the carrying out of that order should be so close that practically they are one and the same thing. A superior must not be disobeyed, immediate and cheerful compliance is essential, and an Officer's duty does not end with giving an order; as one who is responsible for the proper training of his men he must go a step further, and see that the order is complied with. This rests entirely with the Officer himself; the manner in which he gives his order has a very great deal to do with the way in which he will be obeyed. In the English Army, at any rate, it is hardly necessary to urge upon Officers the duty of courtesy towards the men, for it is to be found in a marked degree. The private soldier of to-day is treated by his superior in the Army with a good deal more courtesy and consideration than he would be by his superior in the classes from which he is drawn, but though unnecessary to urge it upon Officers it is very important that we should see that this principle is not forgotten by non-commissioned officers. The latter will do an incalculable harm if they have what we call a bad manner with the men. This may spring partly from ignorance and partly from natural disposition, but whatever be the cause, it is very much to the interest of a Captain of a company to find out by observation how his non-commissioned officers treat the men, and to quickly repress any rough and discourteous treatment.

In a book written some years ago by a colour-sergeant there are some remarks on this subject, which are so much to the point that

they are quoted *in extenso*.¹ "Take every man for what he is worth. Notice the nature and habits of each individual, and treat him so far as *civility* and *courtesy* are concerned as an equal until he proves himself unworthy of such consideration. The sergeant who treats a man with even a shade of disrespect or disdain merely because he happens to be a private soldier or inferior in rank to himself is not only devoid of ordinary common-sense and manliness but a disgrace to the cloth he wears. It is quite time enough to advertise stripes and position when your authority is questioned. Manly pride is a credit to any soldier, but a domineering promenade of rank is only a display of ignorance and imbecility." Officers are fortunate if they get sergeants and corporals who will actually carry out in their dealings with the men principles such as these; the discipline of a company or of a battalion becomes tenfold easier, and a feeling of comfort pervades all ranks. But to attain this they must treat non-commissioned officers in the same way, for the behaviour of the latter to the men is a reflex of the behaviour of the Officers to themselves, only with any mistakes exaggerated, and for the object we want, namely a prompt obedience to orders, mutual respect is necessary.

The Army, of course, contains within its ranks a number of very different natures, and there are many Officers who seem to be able to get what they want done by the men with very little difficulty, while others, though they have the interests of their men really at heart, have plenty of zeal for the Service, and are conscientiously trying to do their duty, yet never seem quite to succeed in establishing what the Duke of Wellington spoke of as "the mutual confidence between Officers and men." With every wish to maintain a strict but not a harsh discipline, they somehow cannot quite manage it, and the force of circumstances drives them into difficult situations, whence they cannot well escape without seeming harshness or undue laxity. We are inclined to think that the quality of being able to deal with men is a natural gift, and we envy the possessors, but while no doubt it is in part natural surely it is not altogether so, it is the result of a variety of mental processes, but there is a good deal which may be learnt if we will only take the trouble to "think and reason right" about it, and see how far natural deficiencies can be made up for by training and disciplining ourselves before we try to discipline others.

It is like a question of horsemanship; the best rider is the one who always has his attention on the alert, and keeps a light but firm hand on the bridle, not one who lets his reins hang loose, and from time to time recalls his horse's attention to the fact that he is in the saddle by a jerk at the curb; the former will get far more out of his horse and take far less out of himself than the latter.

So it is in dealing with men, it is the firm and steady hand which helps discipline; and if an Officer has not got this quality by nature, he will have in the ordinary course of his profession every opportunity of acquiring it, if he wishes to do so. Natural indolence, natural irritability or impatience can be overcome, and unless an Officer does

¹ "Colour-Sergeant's Pocket Book."

succeed in overcoming these things he will never get his orders obeyed in an emergency.

Command is just as much a duty as obedience, and it has been well said that the faculty for so giving an order as to leave the impression that it is as much the duty of him who gives the order to give it as of him who receives it to obey it, is a most valuable one to cultivate.¹ Firstly, then, in giving an order he who gives it must be convinced that it is his duty to do so; unnecessary worrying orders are fatal to discipline, men get fretted by little trivialities being made into matters of importance, and, of course, however trivial the order of a superior may seem to be, it must be obeyed, so all the machinery must be set in motion to obtain perhaps a most insignificant end, and one which some other order quickly following will altogether upset.

An order should be indisputably necessary, and bearing this in mind, it is most important, in the interests of discipline, that it should be well thought out beforehand.

Next it should be very definite. According to Van Hardegg, "an order is short when it does not contain one word too much, complete when there is not a syllable wanting:"² prolixity is above everything to be avoided, it creates a confused impression on the mind of the recipient, and where we want right action to follow right reasoning the idea conveyed to the mind of one who receives an order must be a clear impression of the idea in the mind of the superior who gives it. If, however, the latter, either from an existing indefiniteness in his own mind, or simply from too many words, has clouded his idea, and given forth an uncertain sound, the result will be a wrong or an imperfect one. Then, when given, it must be actually carried out, and he who gives it must take steps to see that this is done, or again a feeling of uncertainty is created which will rapidly grow to alarming dimensions.

There is another point of importance, and that is that everyone who gives an order should thoroughly realize in his own mind what will be the result ensuing from it. Sometimes orders are given which in themselves are perfectly legitimate and right, but which cause an inconceivable amount of friction and discontent because they are either given at the wrong time, or they are of a nature to thoroughly upset a number of collateral things, of which probably the Officer who gave the order had not the slightest idea.

This fact leads to a vital principle in the matter of getting orders obeyed, namely, that every Officer should *thoroughly* know his work, and every little detail, however minute, of the ordinary regimental routine, so that everyone in his own rank may endeavour to avoid those unnecessary frictions which militate against discipline.

Of course, routine is not to be treated as a fetich and blindly worshipped; but when once an established routine has been laid down, and found to be the best from all points of view, a vast amount of worry is saved if this routine be respected by all, and unnecessary

¹ Lecture on the "Connection between the Ordinary Work of Soldiers in Peacetime and Warlike Efficiency," Maurice.

² Lectures on "Staff Duties," Clarke, p. 37.

fidgetting interferences with it, avoided. The men and the non-commissioned officers all feel rubbed up the wrong way, and the military machine goes awry, while a little thought and consideration as to the result of the giving of some particular order would have prevented this, and discipline instead of being weakened would be strengthened.

Fussiness, too, is death to discipline; however well meant, it is fatal in its results. Soldiers are not children, and they get irritated by fussiness, even if the object be their own comfort and advantage, and definiteness of purpose will go a long way with them.

If an Officer knows what he wants, knows that it is right, and that it is his duty to get it done, and clearly and definitely with full confidence in himself expresses his order, in nine cases out of ten it will be obeyed, and in the tenth the remedy is at hand: if, however, he is indefinite, does not feel quite certain of himself or of his own ground, and delivers his orders in a hesitating, confused, or even semi-apologetic way, in nine cases out of ten they will not be obeyed, and for this disobedience he is just as much to blame as anyone else.

To sum up then: the preservation of discipline demands the following conditions in giving orders:

- α.* That the order should be a necessary one, and given as a matter of duty.
- β.* That it should be well thought out, and the result of its being carried into effect should be thoroughly realized.
- γ.* That it should be clear and definite.
- δ.* That steps should be taken to have the order actually carried out.
- ε.* That all fussiness should be avoided.

Punishment.

The question of punishments is a necessary, though a disagreeable feature in any system of discipline; human nature being what it is, strict and clearly defined regulations on this head are an essential part of military life. The rules laid down for our guidance are the result of much thought and practical experience, and few will question the wisdom of by far the larger part of them, but the difficulty comes in the details of carrying them out, in which so much depends upon the tact, temper, and experience of individuals in authority.

The principle upon which punishment should be awarded is most clearly expressed in the Official Manual of Military Law,¹ "discipline enforced by punishment alone is a poor sort of discipline which would not stand any severe strain. What must be aimed at is that high state of discipline which springs from a military system administered with impartiality and judgment, so as to induce in all ranks a feeling of duty, and the assurance that while no offence will be passed over, no offender will be unjustly dealt with." This expresses the three main points to be observed and the object to be gained, namely, impartiality, judgment, and an unbroken sequence between cause and effect tending to produce in all ranks a feeling of duty.

¹ "Manual of Military Law," chap. V, Art. 85.

Of these, the due relation between cause and effect, the certainty that punishment will follow crime, is perhaps the one most to be borne in mind. The regulations of the Service do not in ordinary cases permit any very great deviation likely to cause partiality or want of judgment, but a lax state of discipline may often allow many grave offences to be committed, which go altogether unpunished, simply because the Commanding Officer is not aware of them till the evil has spread, and reached such a pitch that it breaks out in some glaring way, and a severe example has to be made. If a proper idea of duty be absent in the various ranks, they are led to shut their eyes to a state of things which is utterly and radically bad, and so for a time they go on in a sort of false security, till inevitably the crash comes.

Now there is nothing which tends more to preserve discipline than the knowledge among the men that they will not escape the consequences of their acts, that there will be no weak "letting off" on the part of non-commissioned officers and Officers, but that so surely as they break the rules laid down for them, they will have to appear in the orderly room and take their punishment. Of course there are cases where men will deliberately go and commit some military crime with the full knowledge that they will have to take the consequences, and with no attempt at concealment, they simply do as they choose and then brazen it out, but these are not the ordinary cases, and when once a man understands that there is no element of chance about the matter, but that punishment follows crime as a matter of course, he will be a good deal more careful how he conducts himself. Very few people, Officers or others, take any pleasure in dealing out punishment, and young Officers, especially, are inclined to obey the natural promptings of perhaps an easy-going disposition, and to let men off, but this really is the greatest possible mistake, it is not a high sense of duty and is no real kindness, and the sooner every Officer realizes that the question is not one of individual inclination but just simply a matter of duty, that it is just as much an Officer's duty to take steps to have men who break military rules punished, as it is the duty of the offender to have obeyed those rules, the better it will be for them and for their men, and the more a right and sound discipline will flourish.

This does not apply to first offences; in all cases let the existing regulations be loyally and faithfully carried out; let mild reproof and admonition be tried as is laid down, but when these are found useless, and punishment has to be resorted to, let there be no weak holding back, but mindful of the great responsibility which rests upon him, let every Officer, however young he may be and however short his service, follow the regulations, and do his duty.

For young Officers this is often very hard, and by a good many mistakes they gradually learn how to carry out their duties in this matter: the offender is often, in more senses than one, a much older soldier than his superior, and he tries to see how far he can go. Some mistakes will inevitably be made, but it is just as well to bear in mind that while these mistakes are being made, which perhaps no one

ever hears of, or knows, save by their results, the cause of discipline is decidedly suffering. Commanding Officers, Captains of companies, senior Subalterns, and, above all the Adjutant, may and should do very much to help young Officers in this, by putting before them that the military system is one which allows of no display of individual feeling in this matter, but that duty requires a very rigid compliance with rules, for the machinery of discipline must be like Nature herself, and allow no deviation from her laws without an inevitable consequence of punishment.

In another sense, too, it must be like Nature, there must be some logical proportion between the breaking of the law and the consequent penalties, and these penalties must be in all main features the same under similar circumstances. It is very difficult for any man to render himself in a magisterial capacity at all times a perfectly cool and unbiassed administrator of the law, swayed by no personal feeling—feeling not necessarily for or against the offender, but simply the result of the state of mind and body he may be in at the time—but if a Commanding Officer or any Officer wishes to be a good disciplinarian, he must, as far as is possible, train himself to this state. When men begin to see that similar offences meet on different occasions with unequal punishments, at once they know that the element of chance has been brought in, it may be their fortune to come in for a light sentence, or their ill-luck to come in for a heavy one, and as has been said before, this element of chance is one which is very hurtful to discipline. It is far better that a man should know positively that he will undergo a punishment of severity proportionate to his offence than that he should feel uncertain whether he will, on the one hand, be very severely dealt with, or on the other, get off very lightly, and this feeling of certainty will promote discipline as much as the opposite feeling injures it.

There is in the Navy a regular authorized scale of punishment, which is obligatory on all Officers: the punishments laid down are quite sufficiently severe to meet all ordinary cases, and by this scale a uniformity of practice is obtained, which is beneficial. In the Army, although the quality of the punishment is laid down clearly, yet there is room for a considerable amount of uncertainty as to the quantity which may be awarded, and different Commanding Officers take very different views of military offences, or even take different views at different times. Of course the objection to too much fettering of the liberty of action of an Officer is obvious, namely, that men are not machines, and that they must be dealt with according to their various dispositions. This is, no doubt, true, but the military system aims at producing a sort of mechanical form; and further, if all Officers were perfect in tact, temper, judgment, and knowledge of their men, too much latitude could not well be allowed them in fitting their punishments to the nature and disposition of the offender, for they must necessarily be the best judges of what is needed. But unfortunately, this is not, and never will be the case, so the question resolves itself into this, which conduces most to discipline—a feeling of uncertainty among the men as to how much punishment

they will get, or the positive certainty that within not very wide limits they are certain to get a definite well understood punishment, even though a tolerably severe one? It is submitted that the latter circumstances are those most likely to attain the desired end.

Something has been done in this way; in one corps certainly, and probably in many others, there exists a printed list of the various ordinary crimes with the punishments which should be allotted to them for the guidance of Captains of companies, and with the object of securing uniformity throughout the regiment. Such a plan seems to be an excellent one; it would be of the greatest assistance to Captains and Subalterns in command, and further, it would be of assistance to the men themselves, for they would know what to expect, and that they would not get off, while yet more it brings the immediate influence of the Commanding Officer, who sanctioned the rules, down to all ranks in all circumstances, increases the strength of the chain of responsibility, and strengthens discipline of the right kind, doing away with arbitrary punishment as well as with unwise leniency.

Defaulter Sheets.

It is a matter of common knowledge that in a large majority of cases the early period of a man's service does a good deal in the way of filling up his defaulter sheet. Coming fresh from civil life, and being plunged into an entirely new set of circumstances and conditions of life absolutely different from any to which he has been previously accustomed, before he has accommodated himself to the requirements of military discipline, he is very likely to have committed sundry breaches of rules which necessarily have had to take their place in the defaulter sheet, and so he begins by accumulating a black record against himself. When he has become more imbued with the spirit of his military career, unless he is either naturally of a bad character, or has been discouraged by the start he has made, he begins to respect rules and to respect himself, and his offences will diminish in number.

Now would it not be advisable in the interests of discipline to bear this in mind, and not to expect from the young recruit the same matured qualities of a soldier which are demanded from men who have been longer in the Service? It is very discouraging for a young soldier when he first begins to really feel what the requirements of discipline are, and to wish to accommodate his life to them and to become a steady soldier, to find that he has already got a list of offences against him which can never be blotted out. Would it not be practicable, for the first six months at any rate of his career, to keep only a temporary defaulter sheet for him, and at the end of that period for the Commanding Officer to consider all the circumstances of the recruit's service and at his discretion either to destroy the sheet, or direct that certain offences only should be transferred to the sheet which will commence to be kept as a permanent record, or in the case of a man whom he sees to be of really bad character, and whose offences have not arisen either from thoughtlessness or ignor-

ance, to let the whole document stand and continue it as a permanent record as at present?

If some such plan as this could be adopted, a well dispositioned man would have an opportunity of starting afresh at a time when he pretty well understands what military discipline requires of him, while a man of obviously bad character is in just the same position in which he is under the present system.

In cases where the recruit has passed the first six months of his service at the Regimental Dépôt this discretionary power of the Commanding Officer might well be exercised before he is sent to join the service companies. It is true that at this period often his time of greatest temptation begins, but at any rate if he has been six months in the Service he has learnt something about discipline, so if he is good for anything he can look after himself, and this suggestion is by no means intended to prop up the weak-minded, or to underestimate the seriousness of breaches of discipline, but simply to give every man a fair chance of becoming a good and successful soldier.

Imprisonment.

It has been said that the worst use to which a man can be put is to hang him; this may be extended with regard to a soldier to the question of imprisonment, considering him as an individual supported by the State for the performance of certain definite duties, and trained for those duties at a considerable amount of trouble and expense, it is probably about the worst use we can put him to, to imprison him. As long as he is in prison he is an unproductive factor in the Army, he is doing no good, and is still costing money to the country, and when he comes out, there is every prospect of his being a worse soldier than when he went in. Unfortunately, imprisonment is in many cases a necessity, but if the principle is recognized, as it is decidedly being recognized now, that it is a makeshift sort of expedient at the best, it will be well in the interests of discipline, as well as in those of economy, to minimize imprisonment as much as possible.

There is at the present day in the Army a strong feeling on this point, and recent orders and regulations have tended not only to lessen terms of imprisonment, but also, when such punishment cannot be avoided, to keep it as much as possible in the hands of the military authorities. Discipline will not suffer from these regulations, on the contrary it will gain. There is much in military life which is called crime, and from a military point of view is crime, which in civilian life is not crime at all, and it does not seem wise or right that men who have been found guilty of military crime, disgraceful only from its military aspect, should have to pass long months in a public prison, even under all the regulations which may be in force to prevent their being classed in the same category as civilian criminals who have committed some gross breach of the law of the land.

In the class from which soldiers are drawn the stigma of going to gaol is a very deep and real one, and it is a class which is not prone

to appreciate subtle points of reasoning as to the cause for which the imprisonment is awarded, or the nature of the crime which has brought about this punishment. Going to prison simply means to them just what the words convey; they feel the disgrace of it very keenly, and when a soldier comes out of gaol he feels himself lowered in the eyes of society, so that it is difficult for him to make a fresh start, and right himself in the opinion of his world.

In a public gaol, too, he contracts habits and ways of thinking which are in the highest degree inimical to what we wish a soldier to be, and unless very carefully handled on his return to his regiment, he is likely to be a useless soldier, a trouble to his Officers, and a bad influence in his company.

From every point of view, long terms of imprisonment are not likely to do much good; if they are intended to impress upon the offender the sense of his wrong-doing, a shorter term will effect this equally well, and certainly it is not for the good of the State that a soldier should be kept eating the bread of idleness for a longer period than can be avoided, even if the bread be only prison fare. In cases where the gravity of the crime makes a long sentence necessary, it is better in the interests of discipline that it should be coupled with discharge, for the soldier, unless a very exceptional sort of man, is not likely to be of much good afterwards.

If, however, imprisonment can be kept more within the hands of the military authorities many of the objections to it are cancelled. There is not such a marked break in the soldier's career, he does not so completely exchange military discipline for gaol discipline and the moral stigma is not so great. If it be argued that this stigma is a part and an effective part of the punishment, it is submitted in answer that for very many military offences there need be no such moral stigma, and if such be attached to the punishment, the latter overshoots the mark, and is more *severe* than need be the case. It is surely sufficient that a man should feel that having broken the military code he has suffered the military consequences, without feeling that he has also incurred a civil degradation. Of course, for all offences which are disgraceful not only in the eyes of military law but also in the eyes of common law, such as theft, and other offences of a fraudulent kind, or in themselves of a nature which all right-thinking minds would class as disgraceful, these remarks are not intended to apply; if a soldier commits such crimes as these, it is right and just that he should pay the same penalty which he would have paid had he been a civilian, or one even heavier, inasmuch as he has chosen to disgrace a highly honourable profession. They are only intended to be applicable to offences of a purely military nature, and the point sought to be conveyed is that for such offences as these it is desirable in the interests of discipline, and of the well-being of the Army, to keep the whole machinery of awarding and of carrying out the punishment as much as possible in the hands of the military authorities, and to let the imprisonment be undergone in a military prison. Recent regulations have done much to lessen terms of imprisonment in many cases, and might they not be still further

extended to enable the military machinery to deal with sentences for all ordinary offences throughout?

Discharge.

Discharge with ignominy, or discharge as worthless and incorrigible, are two powerful weapons in the hands of the authorities, but it is questionable whether as much advantage is drawn from them as might be the case if they were rather more freely used. If there is one thing more plain than another, and acknowledged on all sides, it is that all recent movements in military legislation have been made with the view of improving the condition of the soldier; we want to have better men under the colours than we had in the old time, and we are getting them. In the wide field, however, from which we draw our recruits, we get hold of some very doubtful characters, and they are nothing but a nuisance when we have got them, they keep up the crime average, both by their own acts and by the example they set to otherwise well-disposed men, and they are not worth keeping. Yet somehow or other, we are very long-suffering before we finally get rid of them, and in the meantime they are a plague spot. Is this because we are so put to it for men that we can't afford to lose these black sheep? Surely not! Recruiting is active, and in a flourishing condition, and we can get soldiers if we want them, whereas the existence of these bad characters in the ranks tends to give soldiering a bad name, and to stop decent recruits from enlisting.

The old prejudice against the Army which used to exist in country districts is dying out very fast, but it has not quite gone yet; it used to be thought by a family in the labouring classes that when one of their number had "gone for a soldier" he had indeed fallen low. This prejudice was the result of an idea, originating perhaps partly from experience but more from tradition, that the soldier generally was a very disreputable and shady class of person, but now fortunately people are improving in this respect; when they see their sons and brothers come back looking smart and neatly dressed, with a good conduct stripe on their arm, and a manly confident bearing, they begin to believe that the Army is not such a bad place after all, and these smart well-conducted lads are very useful recruiting agents in country places.

Now, if the thoroughly low and bad stamp of man be ruthlessly weeded out of the Army, the lads who go back to their homes on leave will be all the more inclined to attract others by their story of military life, and we shall gain both in the number and the quality of recruits; while if the public in general find that the village black-guard is not good enough, nor nearly good enough for a soldier, but that we will not keep him, their ideas about the Army, already, as has been said, improving, will improve still more. If we can reform the ne'er-do-weel—and we very often do, and make him a respectable member of society—all well and good, and the country gains a man, but why keep him to be a thorn in everybody's side, a useless mouth to feed, and an evil influence among his comrades?

The objection is often raised that by discharging a man the authorities simply do for him exactly what he would wish, that having found the Service is not such a good place for a worthless character as he fancied it would be, all he wants is to get out of it. This is true, but if we go to the real root of the matter it is doubtful whether this objection will prove quite a sound and reasonable one. The object we aim at is to get good and trustworthy soldiers, not to use the mechanism of the military machine in making life unpleasant to a bad character who steadily declines to be reformed; if the man is kept in the Service he learns certainly that rules cannot be broken with impunity, and in many cases he passes a large proportion of his time under punishment, but the question is, does the country and the Army gain anything by this? Public money is spent, but is there any adequate return for it; is the general good advanced by the unavailing attempt to make a soldier out of such very unpromising material; would it not be better, even at the risk of falling in with the wishes of the offender, to let him see plainly that the Army does not want him, and will not have him, and to send him about his business summarily? Any satisfaction which he may derive from this can be considerably minimized if he has brought himself into the position of a prisoner before a court-martial by a sharp and severe sentence of imprisonment followed by discharge.

If this measure were a little more freely used, everyone in a regiment would be saved a great deal of trouble, and the cause of discipline would certainly profit. The ranks of the Army can be filled with decent men who will make good soldiers; what therefore is the use of keeping those who simply go on from one crime to another, and are always being punished? Let them go, and the Service is well rid of them.

Importance of Punishment quickly following Offence.

There is another point which it is well worth while to pay strict attention to, and this is that punishment should very quickly follow the offence for which it is due. The regulations in force fully recognize and provide for this, and it only rests with Officers in this, as in most other matters, to follow out the regulations loyally, and to enter into the spirit of them. In all ordinary cases of military crime the circumstances are such that there is usually no difficulty whatever in at once "telling off" a prisoner; it is not often that delay is caused by waiting for evidence or anything of that kind, the administration of the law in the Service on any point therefore need not usually move with halting step. Yet somehow it occasionally does. Officers, in their anxiety to be perfectly fair and just, and to weigh the whole circumstances fully, fail sometimes to bring themselves up to the point of at once deciding and delivering their punishment. It is by no means intended to imply that disposing of prisoners is a sort of matter of routine, and can be just mechanically gone through, very far from it, the serious and responsible nature of the task and the evil consequences of a wrong decision are fully recognized, it is

only wished to convey that remanding prisoners where it can possibly be avoided is a very harmful thing, and tends to injure discipline. A man who goes back to the guard-room to wait for another twenty-four hours or more before his case is disposed of may be, and often is, doing a good deal of harm. If he be of a sour and ill-tempered disposition, this period of waiting will not improve his natural defects, and he will certainly exercise a bad influence on other men, who may come to be with him in the prisoners' room, more especially if the offence for which he is awaiting punishment is one of the nature of insubordination. It is unnecessary to do more than mention this point, for it is one almost too obvious to dwell upon, but it is touched upon here with the view of showing that not only in the interests of discipline should punishment *inevitably* follow crime, but that it should also follow it without delay.

Non-commissioned Officers.

This is perhaps one of the most difficult of all the problems which an Officer has to grapple with if he wants to get good discipline. Who is there who has not at some time or another found himself in the awkward dilemma of either disregarding a non-commissioned officer's story or punishing a man perhaps unjustly? To let a non-commissioned officer feel, and to let the men see, that he is not trusted is fatal to discipline, while to let any man have grounds for thinking that he is unfairly dealt with is equally fatal. If any Officer be in the position of having non-commissioned officers under him who are not perfectly trustworthy, he is likely often to find himself in a very uncomfortable predicament, which it will need all his tact and experience to come safely out of without prejudice to discipline. There is no royal road out of this difficulty, neither Officers nor non-commissioned officers can by any magic process be rendered immaculate specimens of perfect tact and temper and of unerring judgment, but a difficulty fairly looked at and understood, is in a fair way of being overcome by energy and determination.

The question is again simply one of training, a slow and gradual process, but like many other gradual processes, an effective one. To make a very young soldier a non-commissioned officer, however smart he may be, and however capable of repeating pages of the drill book, is simply to court complications of this kind. Before any man is allowed to wear a stripe he should be a proved man, and one who has thoroughly learnt the duty of disciplining himself, before he attempts to exercise any function of command over others. There are plenty of men who have nearly every good quality which a soldier should have—men whom everyone in the regiment would like to see in the non-commissioned ranks—but they have not got just that tact and temper which are needed, and, hard as it may seem, they should never be promoted, at any rate till they have remedied this defect, and this both in the interests of discipline and of themselves.

Again, there are men who make excellent non-commissioned officers in the barrack square, with all the machinery of discipline round

them, and a well-ordered routine to keep things going straight, but away on detachment duty, when they are thrown somewhat on their own resources, they prove dismal failures, and have no resources available when they are wanted. On detachment duty, a non-commissioned officer who has not properly learnt the lesson of discipline either for himself or for others, will go a long way towards making havoc of that of the detachment.

The evil is easy to see, the remedy is not so obvious, but it rests with Officers, the better disciplined they are in the highest sense of the word; the better discipline they will get in their subordinates. The Commanding Officer in selecting, and the Adjutant in training non-commissioned officers, have a serious duty, and the training should be real training, not merely a learning of drill, but a mental training as well, and here again the lecture-room is a valuable aid. Captains of companies can also do much. The German system urges upon company Officers an intimate knowledge of the nature and disposition of their subordinates; theoretically we too hold the same view, but do we carry it out entirely?

It is well worth a Captain's while to study his non-commissioned officers with a considerable amount of care, and to do his share in training them, not by worrying, fault-finding, and general fussiness, but by a persistent course of action, which lets it be felt without his expressing it in so many words that he sees everything, notes everything, and forgets nothing, that he trusts his subordinates, not rashly and without reason but from deliberate knowledge, that where he trusts he trusts fully, and that any betrayal of such trust will meet with severe and prompt measures.

In our Service we are so prone to look upon non-commissioned officers as the peculiar property of the Adjutant that we really create difficulties for ourselves. After all it is a matter of much more importance to the Captain of a troop or company what sort of men he has as the intermediate link between himself and the rank and file than it is to the Adjutant, and it is too much to expect that a non-commissioned officer of a perfect nature and ready trained will be put into his hands ready made, so that he has nothing to do but just to let things go on and everything will be all right. In this point, as in many others, we do not work the company system nearly to the full extent of which it is capable. We have become imbued with the spirit of centralization, and we find it very difficult even in small matters to shake ourselves free from its trammels. The position and responsibility of a Captain of a company is hardly yet fully appreciated, and it never will be so long as we consider that our duties to our companies are over when we have gone through one, or at the most two morning parades, and done a little routine office work as well.

Of late years a good deal has been done to remedy this, but more may still be done. In the German Service more in the way of training is positively and directly put into the hands of Captains, and the superior Officers are even cautioned against unnecessary interference;¹

¹ See "The Training of the German Recruit," in No. 147 of the Journal.—ED.

it is recognized that different means are taken by different men to produce the same ends, and everyone is allowed to pursue his own means so long as the end is obtained, and a general uniformity preserved. At the present day in our Service the Captain has a good deal more to do with the training of his company than he had a few years back, but we are not yet at the end of our tether in this matter, and especially as regards non-commissioned officers the Captain might have more responsibility. It is suggested that the cause of discipline will be served by the extension of the company principle towards this end, such a proceeding will react on the Officers, and produce beneficial results to the whole organization, and so favour the great end in view.

Food.

This is a matter which may at first sight seem to have but little to do with discipline, but if it be recognized that the latter is only the resultant of many very different and distinct forces, physical and moral, the question of food is by no means one which can be overlooked. Discipline aims at the perfection of the human machine; health is one of the primary necessities for this perfection, and food is inseparably connected with health, the consideration of this question therefore fitly finds its place here.

It is a matter of common and everyday experience that a man's temper is very much dependent upon the state of his stomach, and it has passed almost into a proverb that things assume a brighter aspect after a good dinner. This may not perhaps be a very exalted view to take of human nature, but then unfortunately human nature, *per se*, has a good deal about it which is not very exalted, and it is imperative that the student of it should take these meaner qualities into consideration if he wishes to derive any practical results from his observations and any generally applicable rules for guidance. General Gordon is reported to have said, "It is ridiculous to pamper up the Army as you do; you never could take the field;" and added, "I live on meat and biscuit, and whatever I can get;"¹ now if such a spirit could be obtained on the part of the soldier no doubt it would be an excellent thing, and would tend greatly to the simplification of administrative questions; but it cannot be obtained. General Gordon was an exceptional man, and though perhaps there are many individual cases of the same nature, who really have the same contempt which he had for the *means* of life, yet such is not the feeling of the mass, and we have to deal with men as they are and not with men as they might be. A man who is turned out of bed to go through a long parade with either an empty stomach, or one which has only received the merest apology for a breakfast, is not in a state of mind or body which is conducive to his keeping himself well within the bounds of discipline if anything occurs to ruffle him, and this is especially the case with recruits, who not only usually have larger

¹ "Journal R.U.S.I.," vol. xxviii, p. 905.

appetites, and so feel the effect of an empty stomach more keenly, but also in their early days in the Service have morning parades which hardly the greatest enthusiast could call specially interesting; the steady continuance of the extension motions and the goose step being somewhat trying, even to the best temper.

It has been remarked by a General Officer that if we gave the men more to eat we should decrease crime in the Army, and he further said,¹ "I recollect being told by an Officer of Marines at Fort Cumberland that he had put a stop to all the insubordination that had previously existed simply by getting the men to eat something for breakfast. Half the insubordination in the Service is due to men coming in late at night and being turned out early in the morning, perhaps for 5 or 6 o'clock parade, without a meal inside them to put them in good humour. This Officer said the first thing he did was to get in some herrings and eggs and to send them round to the barrack-rooms every morning, and every man instead of having a piece of dry bread which he has no appetite to eat and a cup of bad coffee, made a bit of a breakfast, was in good humour with himself and his superiors, and then there was no more insubordination." Now this is an extremely simple and practical way of proceeding, and has about it an element of common-sense which at once commends it. Another General Officer stated quite recently that in reporting upon soldiers' food he spoke of it as "good, but not ample," and these two statements from Officers of plenty of experience show that something remains to be done in this direction.

Exact science, with calculations of heat value and work value, says that the soldier's food is sufficient, but then exact science cannot by its nature duly take into account the ever varying personal factors of the equation. What is sufficient for the old soldier, with all his muscles set and his bodily frame fully developed, is by no means necessarily enough for the hungry young recruit, who is daily adding to his supply of bone and muscle, and who also is doing work of a kind to which he has been utterly unaccustomed, and which demands bodily exertions of a kind very different from those required by his former avocation, whatever it may have been, but all necessary in the process of "setting him up" as a soldier.

The difficulties in the way of increasing the daily ration at the public expense may be great, but surely are not insuperable if the common consensus of the opinion of those who have experience point to the necessity for doing so, and in the meantime if a Commanding Officer sees that his recruits do not have as much to eat as they ought, although the old soldiers may be amply fed, much can be done regimentally in the way of supplying the deficiency. Much is done in many cases, and the way in which the subject has been discussed of late will doubtless lead to more being done by some who have hitherto been content to accept the existing order of things.

If the cause of discipline can be at all advanced by a little common-sense attention to the matter of food it is well worth while devoting this attention to it, for a young soldier before he has thoroughly

¹ "Journal R.U.S.I.," vol. xxviii, p. 901.

learnt the lesson of discipline will have plenty of temptation to break through its rules without having the additional one of an empty or only half-filled stomach to add to them.¹

Gymnastic Exercises and Athletics.

Connected, too, with the subject of food, inasmuch as both tend to create the "*mens sana in corpore sano*," is that of gymnastic exercises. A healthy frame hardened to endurance is a most important factor in the question of discipline, and nothing which tends to produce this healthy frame should be omitted. Gymnastics and all kinds of physical exercise are most valuable, particularly if they can be made interesting to the soldier. They brace him up in mind and body, and also provide occupation for the hours of leisure which, if unemployed, play such havoc with the spirit of discipline.

It cannot be too strongly urged that this spirit has to be cultivated, not only in the barrack-square and in the barrack-room, but also in every part of the life of a soldier. The problem is to make a man master of himself in all circumstances, and the exercise of the gymnasium and the practice of healthy out-of-door games are valuable aids to this. The two great temptations which a soldier has to confront when he is off duty are drink and impurity; either is highly prejudicial to discipline, the two combined are fatal. Unfortunately the temptations to both are always in his way, and are very difficult, indeed almost impossible to remove, but while philanthropists, moralists, and social reformers attack the monsters directly in front, Officers, while not neglecting a front attack, can do much valuable work in delivering one in flank, by encouraging a healthy and manly spirit among the men. A more extended and practical use of the gymnasium, such as is now becoming the rule in the Army, thanks to Officers of experience who are full of well-directed zeal for the good of the soldier, is a great help in this direction. Every single thing which will train the physical and moral nature a little more highly, which will teach endurance, patience, and self-control, cannot fail to help the cause of discipline, for, after all, what is this quality in its very highest aspect but the triumph of the moral nature over the physical? And in the case of the soldier we want to obtain this result, not by the fatal mistake of starving the physical and exaggerating the moral part, but by a judicious and side-by-side development of the two tending to produce a perfect man.

It is hardly necessary to refer to the desirability of encouraging sports and games in which the Officers take part, for they are so much an integral part of our system, and an exceedingly good and healthy part which can hardly be overvalued. They strengthen the bond of "mutual respect" between Officers and men, and as every tiny cog, however minute, is essential to the working of some complicated machine, so in dealing with that most complicated of all

¹ The above was written before the appointment of the Committee recently appointed to inquire into this subject.

machines, Man, which is what an Officer has to do, it is well to bear in mind that these questions of physical development, both by gymnastics and athletic exercises, have a very important and real influence upon the final result.

Leave.

The regulations on the subject of leave have of late undergone so great and radical a change that it amounts almost to a complete revolution. When first the new orders with regard to standing passes were issued, ominous growls might have been heard from some as to the results of this extension of the liberty of the soldier, but no bad effect has resulted from the experiment, and, without doubt, every regulation of the kind which treats a man more as a man and less as a child, is in the long run beneficial. The men feel themselves more independent, and being more independent they are happier, while discipline does not suffer from the existence of this feeling, on the contrary it gains, for the temptations to leave-breaking are minimized.

It cannot be too much borne in mind that the soldier of to-day is, as has been said before, a very different stamp of man from the soldier of some years back, and that some of the rules and regulations with which he was hedged round in the old days are really no longer necessary. If one of the main objects of discipline is to prevent crime, then every wise legislation like that of increasing the facilities of getting leave is all in the right way to achieve that object, and provided that duty is always done, and well done, there is no reason why the men should not have leave.

We know that we want to render a soldier self-reliant in the field, and this will only be done by rendering him self-reliant in peace, not by so compassing him about with rules and restrictions that every action of his life is laid down by regulation, but by so ordering the regulations that the right principle is inculcated, and the soldier is more left to himself, provided that the principle is not transgressed. In this light, extensions of the privilege of leave have proved an encouragement to all, and both directly and indirectly have tended to promote discipline.

Regimental Institutions.

Under this head may be classed all the various things which, apart from parade duties, make up the life of the soldier in barracks, such as canteens, recreation rooms, libraries, &c. They all have an important influence on the discipline of a regiment, for, according as they are rightly or wrongly used, they act strongly for or against it.

The canteen, for instance, unless a good deal of trouble is taken about the management of it, may be a regular curse to a regiment, only in a small degree less objectionable than the low drinking shops which cluster like fungus growths round a barrack or a camp. But though it may be an agent for evil from the point of view of

discipline, as well as from that of morality, yet it need not necessarily be so. No doubt, if we could have a teetotal army we should remove one of the main factors which militate against discipline, for what is more familiar than the saying that "drink is the curse of the British soldier?" It has been so in times gone by, and, though perhaps not in such a marked degree, it is so still. But we cannot have a teetotal army, and we never shall, it is better therefore to deal with the matter as it is, and not as it might be, and in that light it is desirable that a man should be able to get his glass of beer at the canteen, where, at any rate, he is free from the most objectionable features of beer-shops outside the barracks.

The only thing is that, like everything else, the canteen wants very careful looking after, and there should be no doubt whatever that it is *entirely* in the hands of the military authorities, and that external influence is not allowed to get the upper hand.

It is an open question whether it is altogether a good thing for the men to let the canteen be merely a sort of well regulated music hall within the barrack gates ; it certainly keeps them from what is worse, but still it is a question whether it is altogether the best way. Of course the question is, strictly speaking, a moral one, but inasmuch as discipline in its extended and most comprehensive sense is a moral quality, it is difficult to dissociate the question of military discipline from that of morals. Everyone will admit, whatever views they may hold on the subject, that the usual style of music hall entertainment, however well regulated, is not an elevating style, and one of the objects of discipline being to raise the personal standard, unless we use our canteens in such a way that the men are really better off with them than they would be without them, we might just as well do away with them altogether. It is therefore here suggested that, taking everything into consideration, the military canteen had better just be what it professes to be, and not a music hall.

It can be used, though some people will consider this almost a contradiction in terms, as a check against our great evil, drink, and as such it should be used. Admitted that Englishmen are not likely to become a teetotal nation, and that soldiers are not going to be exceptions to the class from which they are drawn, let everything be done by strict regulation in barracks to make them temperate, and to conduct the management of the canteen with all possible care. It may be and will be, unless someone takes the trouble to see that it is not, a great evil, and it is usually rather a dangerous place in the fight for discipline, but, recognizing it as a weak place, it is not an unworthy task for any Commanding Officer to see that a very strict eye is kept upon the way in which it is conducted.

It is not intended here to say one word against teetotalism ; men who are total abstainers are in many ways far more easy to manage than others, and all honour to those who are ; but as a majority of teetotalers in a regiment is a Utopian dream, the question has to be dealt with of making the men as temperate as possible.

This works back again to what has been said before as to the desirability of encouraging athletic games and gymnastic exercises,

for all these things work towards the same end. If a man be an idle loafer, directly he is off duty, the chances are ten to one that he will drink, if he does that, discipline gradually but very surely goes, so it is well to give him as much healthy employment in the way of recreation, as well as in the way of work, as can be managed.

Recreation Rooms.—Too much cannot be said in favour of regimental reading and recreation rooms. There are plenty of men in the ranks now-a-days who like to read, and certainly a barrack-room under the most favourable aspect is not the best place for quiet pursuits, so to many the reading room is an unmixed blessing. People outside the Army have very little idea of the really high standard of intellectual attainments which is very often to be found among men in the ranks, but those in the Army do know, and they know moreover that such men are just those who are wanted, everything therefore should be done to encourage them, and to give them an opportunity of cultivating their tastes.

All these little details of the interior economy of a regiment are really most important to the cause of discipline, quite as important in their way as the actual discipline pure and simple on parade.

We all know the well-worn old saying, which has in its day done any amount of harm because of its half truth, namely, that “the greatest blackguards make the best soldiers.” Now if this be the truth, and the whole truth, what good is there in trying to raise the standard of the men, and make them lead decent and comfortable lives—if they have enough to eat, a proper place to sleep in, and their health is properly kept up, what good is there in doing any more? But it is not the whole truth, it may be partly true, but then is it true because really a blackguard makes a good soldier *ipso facto*, or is it not rather because many of the qualities which go to make a blackguard are those which, if rightly directed, also make a soldier? A certain reckless daring and an independent spirit, if allowed to run riot, are very likely to lead to making a man of no use to himself or to anyone else, but, if properly dealt with, are invaluable in military life. The circumstances which have given rise to this questionable dictum have been circumstances in which the blackguard under external influences has forgotten his blackguardism, and has used the qualities, which he has hitherto wrongly employed, in the effort to do his duty as a soldier; he has proved himself a good soldier, not because he was a blackguard, but in spite of his being one.

Now, at the present day we are not yet quite free from the trammels of this wrong idea; we are very much afraid of making our men soft, and a very proper thing to be afraid of too, but the cultivation of their better qualities will not have this tendency. If, as has been said: “discipline must be looked upon as the main sheet anchor to overcome man’s inherent fear of death and danger, and the bonds must be tightened up when the critical moment arrives,”¹ surely this

¹ Remark of a German Officer, quoted by Colonel Hale in a lecture at Aldershot, 1888.

tightening up will be all the more easy a process if a man's nature has been developed in its higher qualities, than if he has been made simply a very superior animal.

All the interior arrangements, whereby life in barracks or camp is made to take as high a standard as possible, will tend towards discipline, and no labour expended in making the soldier's life a comfortable though not a luxurious one, and in trying to keep him from simple animalism, will be labour lost.

Sergeants' Messes.—Here, in passing, a few words may be said about sergeants' messes. These institutions, excellent as they are in themselves, and greatly as they tend to raise the tone of the non-commissioned officers, and so to help discipline, yet are not always an unmixed good. In spite of regulations to prevent anything of the kind, a good deal often goes on in sergeants' messes which is in the highest degree prejudicial to discipline. A sergeant's pay is not very large, and often things are done by the mess which it is difficult to understand how the pay they get can be made to do, viz., occasional dances, entertainments of one kind and another, and above all, arrangements for card parties with other sergeants' messes, and so on. An Officer's pay will scarcely be made to cover such things, and it is difficult to see how a sergeant's can. Every Commanding Officer and every Adjutant will probably be able to call to mind, not one, but several instances of outside debts contracted by sergeants, which they cannot meet, and which spoil the career of many a promising non-commissioned officer. Such things do not help discipline. When once a man gets his head under water and cannot meet his liabilities, it is idle to think of doing much in the way of disciplining him, or expecting him to discipline others, till he can again "look the whole world in the face."

The evil may not be a very great or widespread one, it is to be hoped that it is not, but none the less it does exist in certain cases, and sergeants' messes want to have a very careful and strict eye over them, not a worrying interference, but a wise supervision so that things which it is evident that men in that position cannot afford to do, may be checked in time, otherwise much harm will be done.

Employment of Discharged Soldiers.

The question of the employment of discharged soldiers is one which is at present very much before the minds of those who take an interest in the Army, and it is a question which is very really and intimately connected with that of discipline, both directly and indirectly; directly, because the more a man's stake in the Service is increased, and the more he has to gain by good conduct, the more inducement there is to him to behave well, and indirectly because it is a question which very much affects the non-commissioned officer class, and everything which can be done to improve this class and get good and trustworthy non-commissioned officers reacts at once for good upon the discipline of the rank and file.

In Germany the question of employment for men who have served

and are entitled to pension has been taken up and made an integral part of the military system, the result being, in the opinion of competent judges, a most beneficial one. There, the employment of pensioners is actually a part of the Pensions Act, and civil employment and pension go side by side, and are mutually the complement one of the other. Either the employment takes the place of pension altogether, or does so in a great measure, and consequently lightens very considerably the burden on the State, as well as exercising a very beneficial effect upon the soldier, for all recommendations for civil employment on leaving the army are dependent upon good conduct while serving.¹

Now while it is of course useless to take a system which suits one nation under certain specified conditions, and apply it to another nation in which those conditions are wanting, it certainly does seem that we in England might adopt some such practice as that in existence in Germany, modifying it to suit our own circumstances.

The acknowledged excellence and the popularity of the Corps of Commissionaires has shown us, did we need showing, what an opening there is in this direction, and it would be a very good thing if we could extend this principle of the employment of old soldiers and sailors, and if it could be reduced to a systematic plan under the encouragement and direction of the State. What is a more pitiable sight than to see an old soldier or sailor in a destitute, miserable, and ragged condition, wearing perhaps the dingy and faded ribbons of the medals he has won, begging by the roadside, or to see the crowd of semi-clad, dishevelled-looking men who wander about the neighbourhood of great camps, such as Aldershot, and pick up a precarious livelihood by selling refreshments to the troops on field-days? Does such a sight inspire in the minds of men still serving, any of that high spirit of pride for their profession which is all essential to discipline, does it encourage them to keep on in a steady and well-conducted course with the probable hope of attaining, when they leave the Service, to a good and independent position? Surely not, surely it does just the very opposite to this.

Of course it will be at once said that the men such as those described above are not those who would have done any good in any case, that they are the dissolute and the drunken, the hard bargains of the Army, and that anyhow they were bound to "go under." This is in a great measure true enough, but it is not so in every case; there are amongst them men who have tried and failed, weak ones, perhaps, but then the world contains many such, and a little judicious encouragement will often train some of the weak ones to be stronger than the strong in the battle of life, encouragement which an assured future might perhaps give. Looking at the root of the matter, in very many cases what incentive has been put before a man to consider his military career as only one stage in life's journey, and to look on to another position after he shall have served his time? It is essential that when a man takes off his scarlet coat and steps into the ranks of civil life he should have some employment whereby he may

¹ Reichs-Militär-Pensions Gesetz, 1870.

support himself and probably a wife and family, and if only we could arrive at some system of making such employment a certainty for a well-conducted man, we should make great strides in obtaining the discipline we wish to get.

Never mind about the men who really after all our efforts turn out as no good, it has already been indicated what course we had better pursue with them; but men who do try and succeed in doing well in their military career should have some prospect of future employment to look forward to. Everyone with any experience of the Army knows well the anxiety which men display towards the end of their service to get themselves employment in civil life, and there are probably few Officers serving who have not taken a good deal of trouble to help men whose value they know, to get work, but whatever individual effort can do in the matter it is not the same thing as if some general system could be adopted for the attainment of this object. It is always a precarious matter for the soldier to depend upon the assistance of an individual, and very likely in the changes and chances of military life those Officers who know him best will not be at hand when he comes to take his discharge, to give him the helping hand he needs; whereas if from the commencement of his career he were aware that if he continued long enough in the Service to gain his pension, employment in after years would reward him, he would have throughout a strong incentive to walk in the straight paths of discipline. Put something before a man which is worth his gaining, and at once you give him a motive which appeals to the better part in him, and this is half the battle in getting discipline.

While he is in the Service he can look forward to promotion, but we want to have something on which he can count in the future, and the certainty of employment will prove a very powerful auxiliary in maintaining discipline, both directly, because it gives the men more to gain and more to lose, and, indirectly, because it will attract a good class of men to the ranks, when they see that the Army means not only a temporary provision, but if rightly used an honourable profession, and a livelihood in the days when the barrack and the camp have been left behind.

The objection, of course, is the multitude of civilians who have to gain their living, and who cry out loudly if what they regard as their rightful heritage is taken away and given to old soldiers and sailors. This is a genuine objection perhaps, but it is not such a very strong one; the numbers who have to find work and food remain unaltered, and it is difficult to see why if any class has to go the wall, it should be the old soldier class. We admit that in our recruiting under a voluntary system we have to compete with the labour market, and if a young man takes up soldiering as a profession, just as he might take up any other calling, there seems no reason on the face of things why he should be in a worse position as regards his future than others. All cannot rise to the highest non-commissioned ranks, and for the great majority some calling will be necessary when they go into civil life, and if we have taken a man's best years we ought to do something to help him when he leaves us.

While he has been serving his country his civilian brother has had the whole labour market open to him, and there are plenty of lines of life, indeed it might be said nearly all, which are open to the latter without encroaching upon those connected with the Government departments of the country in which the old soldier could well be employed.

At our public offices why should we have civilian messengers and employés of various descriptions doing duties which old soldiers would do equally well, indeed very much better, for they have been trained in the best of all schools?

It is not an increase of pension which is wanted, that would be undesirable altogether, it is work, it is that the country should be able to guarantee to a man that, if he makes a good soldier, when his military career is finished something else will be found for him to do, and having such a guarantee to keep in mind all through his service will have a beneficial effect both upon himself and upon the Army generally.

Nor is the question one affecting pensioners only; we have the larger class of our reserve men to look after also, they want work as much as anyone, and they are certainly at a disadvantage in finding it, besides that the little sum of money which they have in hand when they leave too often inclines them to put off looking for work till they have begun to go down the hill, which ends in their losing the qualities which their military training has given them, and becoming simply loafers. Surely it is worth while to think of these things, and to let our men know that having got them we will stand by them, and make some systematic effort both in Army and Navy to get them employment under Government when they have done their time with the colours.

Some people have a sort of dread lest England should become too military; this dread was rampant in times past, and even now it lingers on. They think that if when a little rough work has to be done they pay their soldiers to do it for them, and look upon it as only being their immediate concern to pay the bill, all will go smoothly, and the work being done, they tolerate soldiers rather than approve of them. This spirit is not as bad as it was, but it wants a little exorcising yet, it is a fatal one for the Army and an unworthy one for any citizen to possess, whatever the work which has to be done may be, it cannot be done without a well-disciplined force, and the mental attitude of the country towards the Army is a powerful though not strictly measurable factor in the question of discipline. There should not be a particle of jealousy about men who have served as soldiers getting Government employment afterwards; they deserve it, and they should have it, for they have fulfilled one of the primary obligations of an organized state of society, and rendered personal service to the State.

England has yet much to learn about her interior and exterior organization, and if she still dreads becoming too military, it behoves her to take care that the part which is military is thoroughly and unquestionably efficient; and since one of the most important items of

efficiency is discipline, this question of the employment of soldiers in civil or semi-civil capacities should be fairly considered as bearing upon the latter quality.

Combined Manœuvres.

The best means of promoting and maintaining discipline can hardly be considered to have been fully dealt with without some mention having been made of the subject of combined manœuvres, considering them in the light of their value from a disciplinary rather than from a tactical point of view, the latter being beyond the scope of this essay.

Combined manœuvres are valuable in this respect for many reasons. It is an excellent thing that a regiment should be from time to time taken out of a barrack and placed under canvas, as this makes a very good opportunity of testing progress, and is more assimilated to that actual work of a soldier in war for which we are trying to train the men. In a barrack or standing camp the routine goes on steadily, and everyone gets to know his place and duty so well that no very great effort is required to keep things going, but when men are under canvas all this is different, it causes a general shake-up, so to speak, of all ranks, and throws everyone more upon his own resources, which is a very desirable thing, for Commanding Officers can then better gauge the value of the Officers, non-commissioned officers, and men under them. It does away with a mechanical method of going on, and is beneficial to everybody; weak points and strong ones will appear which have hitherto perhaps escaped observation, and it is better that we should discover our weak points before we actually take the field in war, when it may be too late to remedy them.

There is also another point in which combined manœuvres are valuable; we think a great deal of *esprit de corps* and try to encourage it, rightly too, for it has important consequences, but we are rather inclined to have an *esprit de corps* which is that of an arm rather than of an army, and this is not desirable. There is a tendency towards a feeling of cavalry *versus* infantry, infantry *versus* artillery, and so on, which is not good, and does not help towards a harmonious working of the whole when all arms are placed, as they must be in the field, together.

Now, this feeling arises in a great measure from isolation of the different branches and arms, they do not know very much about one another as an ordinary rule, and so this sort of jealous feeling gets intensified and magnified by ignorance. Much of it might be removed by a more extensive use of combined manœuvres, all arms would learn that one is just as essential as the other for the conduct of war, and a better knowledge of one another would tend to more harmonious working.

It is not meant that it is necessary that we should mass a great number of troops in a distant camp, and undertake large and extensive operations; they are a great expense, and it is questionable whether they are the most valuable for instructional purposes, but we

could set about what we want in a smaller way. Wherever a brigade of infantry, a regiment of cavalry, and a couple of batteries of artillery can be got together, a very useful instructional camp could be formed without any very great expense, and all ranks, from the Commanders downward, would then have an opportunity of learning something more about one another, of learning that no arm by itself is the Army, but that all have their place, and thus friction between different arms would be removed, and useful lessons of discipline be taught.

The Volunteers make much more use of camp than the Regulars because they are obliged to do so if they want really to test their progress in soldiering, and it would be a good thing if we could follow their example, and rub up against one another more freely.

The use of such a centre as Aldershot is invaluable, and leads to more real soldiering being learnt, and to a better discipline, in its wide sense, being obtained in the course of a couple of drill seasons than would be obtained in years elsewhere if a regiment were stationed in some isolated barrack. It is not necessary to make another Aldershot, or to attempt anything on such a large scale as that; but surely we could manage that in every district, after the harvest is off the ground, we could put the men under canvas, all arms together, and work them together so as to lead to a more comprehensive spirit among them, and to test the instruction which has been given to them.

Such a course would not be productive of any great expense, and the result would be so beneficial that it would be money well laid out.

Writing to the Papers.

Finally, before leaving the subject, there is one point of a very different nature to be touched upon, namely, a practice which is growing daily of writing to the papers about questions of regimental and Army discipline and administration—a practice which is most harmful. We are all more or less guilty in this matter, and it is one which should be checked, or the cause of discipline will inevitably suffer.

It is not that we want any new regulations on the subject, it is only that we want to observe more strictly the old ones, and to remember our position and duty as soldiers before we hurry to air our grievances in print.

Take up any of the Service papers, and how many “growls” are there to be found from all ranks on all sorts of subjects connected with military life. Now, all this does great harm, and argues the existence of a wrong spirit; perhaps it is true that it is an Englishman’s privilege to grumble, but it is not an English soldier’s privilege to grumble in print, indeed it is his bounden duty not to do so.

The spread of education, which has been previously referred to, has brought this evil upon us, and it is very unfortunate that it has done so, and the sooner we shake ourselves free from it the better. If anyone in the Army has a legitimate grievance there are legitimate channels for ventilating it, and the various letters signed with all the

pseudonyms which reveal the writer's status while they conceal his identity, are not the legitimate channels. Instances could be adduced by the score of this sort of thing if it were necessary, but it is not; Officers who think that they are hardly used, non-commissioned officers who have a grumble about something, men who want something which the regulations do not provide for them, all air their opinions in the Press, and this argues both a want of confidence in the higher authorities, and a want of loyalty to the military system, which is most reprehensible.

It is not denied that there are grievances to rectify, changes in social conditions to which corresponding changes in military conditions should be adjusted, and improvements to be effected, but it is the business of the authorities to do this, and they can and will do it without having their duties pointed out to them by those under their command through this medium.

It is not to be supposed that they are influenced by these growls, their sense of duty must preclude that, and, as a matter of fact, at the present time it is hardly possible that any real grievance can exist which will not be patiently listened to, and thoroughly investigated when it is properly put forward in the duly authorized channel; any attempt therefore to force the hand of responsible authorities by letters to the papers is very much to be deprecated. Real evils can be brought to the knowledge of those whose duty it is to remedy them in a better way than this, and imaginary evils had better be buried in the bosoms of the malcontents in the hope that time will lead them to take a juster view of their position, and not have their sore point kept sensitive by seeing their grievance in print with probably a host of other letters on the subject tacked on to the original one. So long as men are serving they should abstain from writing grumbling letters to the papers; when they have left the Service the conditions are different, but even then, if they have the interests of the Army at all at heart, they will be very guarded in the use of their pen in this way, for the grumble pure and simple is not very edifying or very useful. These remarks are not intended to apply to letters thoughtfully written by men of weight and standing who are fully aware of their responsibilities, and write upon matters of administration which they thoroughly understand, and which they wish to present in the light in which they appear to them; such letters are on a different footing altogether. When a personal feeling is not the motive, but real zeal for the Service and desire for its good, a clear and impartial discussion of facts has a good result, it sets others thinking, and diffuses knowledge on various points, and letters dictated by this spirit do good, but the remarks are directed against the publication of the thousand and one petty little personal grievances which are too apt to find their way into the papers, and are ventilated by those who only see one very small section of the matter, the section which immediately concerns themselves, and in the cause of discipline a Commanding Officer will do well to check sharply any such letters as these being written for publication by those under his command.

Conclusion.

The object of this essay has been not to propose any new or sweeping changes, or to suggest a course of action at variance with that which has for so many years been pursued in the English Service ; it has been simply to review the existing machinery of discipline, and to show that this by itself is fully competent to attain the desired end provided that it is faithfully and loyally used, and carried out in the fullest extent of its spirit as well as of its letter.

The question of disciplinary companies which are in vogue in so many Continental armies has not even been touched upon, for it is foreign to the spirit of our English ideas, and with our system of voluntary service need not be used. We have already got all that we need for our work, and the only question now is, how to use our materials aright.

The attainment of discipline is a long and sometimes an uphill task ; like most other things it is only done by slow degrees, and success is only to be achieved by persevering efforts which never lose sight of the goal, but steadily inch by inch fight their way towards it.

The question is one of combined moral and physical qualities, and must be considered in all its complex relations by those who would discipline the men under them. No incident of military life is too small to exercise its influence upon the result, no incident is so important that it alone can do the work ; the whole process is that of some great and complicated machine the effect of which is clearly evident, but to the production of which effect the perfect adjustment of the minutest cog, of the most delicate and almost imperceptible spring, is necessary.

The end before us is a noble one, the means are surely therefore worthy of our earnest attention. Soldiering is now no holiday pastime, it is not and can never be an occupation to fill up odd moments, and to be taken up as a sort of semblance of employment, it must be the real hard and earnest work of a life.

Just in proportion as everyone feels this, so will a perfect discipline be easier of attainment. No one must think that such and such a point is not his peculiar province but is more the duty of the Colonel, or of the Adjutant, or of the sergeant-major, or of someone else ; the duty of working for discipline in every point is one which belongs to each individual in his own sphere, and by each carrying it out in his own sphere, the spirit and tone of the whole will be raised.

"The chain of responsibility" must be no mere figure of speech, it must be a reality ; the chain must have no weak links, they must all be capable of bearing the maximum strain which is ever likely to be exerted, and this in military life is the greatest possible.

The work of peace-time, and all the routine of ordinary barrack life, may at times seem dull and uninteresting, and it may not be easy to see how it all works towards the great end, but nevertheless it does so work, and the end can never be achieved without all this routine. We may think that we should like to strike out some new

line, and throw over all the old ideas, but we can never do so, there is no royal road to success in this any more than in any other task. What we can do, and what we should do, is to alter the old ideas where necessary so as to make them conformable to altered conditions of things, but the principle which dictated them holds good to-day as much as it has ever done in time past, and we shall miss our mark if we fail to appreciate this.

The conclusion then is that we should first try to realize the conditions of the problem, and train *ourselves* to a high state of discipline, and then set to work in every action of our life as soldiers to apply these conditions. Whether it be in the giving of a simple order, the telling off of a prisoner, the inspection of a barrack-room, or in any other circumstances whatever, we should look to the end, and endeavour with all our might to be thorough and whole-hearted in striving for this end.

The past history of the British Army has been a glorious one, and it rests with every Officer now serving to make the future history worthy of the traditions of the past; this is to be done by an unremitting attention to detail, a steady devotion to duty, and a constant endeavour to grasp the spirit of each rule of military life, and to loyally carry it out in practice.

His utmost is demanded from each; no listless easy-going temper will do, but a strong well-directed energy which sees clearly the end to be attained, and never falters till the task is done.

ESSAY.¹

DISCIPLINE: ITS IMPORTANCE TO AN ARMED FORCE, AND THE MEANS OF PROMOTING AND MAINTAINING IT.

By Captain C. E. D. TELFER, Worcester Regiment.

“Viresco.”

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¹ This and the following Essays are printed in the order given in the report of Referees.—ED.

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PART I.

“In anarchy there is still a nation,—without discipline there is no longer an army!”—LAMARTINE.

Discipline: its Aim and Object.

THE great aim and object of all discipline is not only to maintain order and to insure obedience and submission to authority, but also to produce and establish that cohesion between the individuals composing an army, which is essential if complete success is to be obtained in the operations in which it may happen to be engaged.

Such cohesion is the foundation of a mutual trust and reliance extending through all ranks, from the highest to the lowest. Its

existence in an armed force, besides securing a compliance by individuals with the orders which they may receive, gives rise, in addition, to an intelligent desire to carry out the instructions of superior authority, not only in the letter but also in the spirit, and furthermore imparts a reliable courage, which would otherwise be wanting, to large bodies of men.

Importance in large Armies of Present Day.—With the vast armies of the present day, considerable portions of a force taking the field must at all times be more or less withdrawn from the direct supervision of the Commander-in-Chief, and hence, as great individual freedom of action must frequently arise, it is most necessary that discipline should be shown in its highest form, by all ranks loyally contributing in every way to the success of the general plan, without regard to the fulfilment of selfish ideas and aims.

Opinion of Jomini.—"Concert in action makes strength," says Jomini, "order produces this concert, and discipline insures order, and without discipline and order no success is possible."¹

Period from which Campaigns have been selected for Illustration.—The records of the military history of all ages teem with examples which might be quoted to support this assertion; but in the following pages, I have confined myself to the consideration of a few episodes in the campaigns which have been waged during the period of about 120 years which elapsed between 1757 and 1877 inclusive. These limits have been fixed because, on the one hand, more remote researches into history would lead up to events which happened under conditions differing widely, in a military point of view, from those which now prevail, and the examination of which would be beyond the limits of the present essay; whilst, on the other hand, although during the past ten or twelve years, several triumphs of disciplined over undisciplined force have been presented to the world, yet these have scarcely become sufficiently matters of history to be open to examination, or to comparison.

I shall endeavour to illustrate, by a careful consideration of examples thus selected, the importance of discipline to military bodies, and shall in conclusion draw attention to certain changes which have occurred in the conditions of warfare, which will tend to render discipline of even greater moment in the campaigns of the future than it has been in those of bygone days.

Lessons taught by History of Campaigns included in this Period.—The history of the campaigns included during the above period teaches the following lessons:—

1. That, in battle, disciplined troops generally exhibit a capacity for concentrating superior force on decisive points, and hence of being victorious and inflicting heavy losses on their opponents, when numerically inferior to them; whilst, on the contrary, bodies of men deficient in discipline generally evince an incapacity for combination or for sustained effort on any fixed principle.

2. That discipline confers a steadfast courage, coolness in danger,

¹ "The Art of War," chap. ii.

and rallying power; and that where it is absent, an impulsive and uncertain valour and liability to panic will generally prevail.

3. That the presence of discipline is a sure guarantee of attention to details, aptitude for obtaining information and security, and power of executing all operations, apart from actually fighting, with completeness and precision; and that its absence always leads to carelessness and neglect in such matters, coupled with frequent miscarriages and failures, the result of the want of order and subordination.

4. That discipline can alone be relied on to prevent those barbarities, not only against the enemy but also against the persons and property of the inhabitants of the theatre of war, which invariably disgrace the operations of undisciplined troops, and which are calculated to embitter resistance and increase the difficulty of supply.

1. Capacity for Combination and Concentration possessed by Disciplined Troops, and Incapacity of Undisciplined Troops in this respect.

EXAMPLES: (a.) *Battle of the Pyramids.*—The battles in which small European armies have been pitted against the vast hordes of Eastern potentates afford some of the most striking examples that can be adduced of the superiority in fighting power, and in the capacity for concentrating their energies at the right time and place, which is conferred on bodies of armed men by the cohesion arising from discipline. These examples are specially remarkable in cases in which the European soldiers have been individually inferior in strength and skill to their warlike opponents. Thus when the French were advancing from Alexandria to Cairo in 1798, their force had been reduced by losses in battle, by sickness, and by detachments to about 10,000 men.

On the morning of the 21st July they were confronted at Embabeh by 30,000 men under Mourad Bey.

The right wing of this force rested on the Nile and, being principally composed of infantry, occupied to the number of 20,000 men an entrenched camp, which was further protected by forty pieces of artillery. The Mameluke cavalry, to the number of from 9,000 to 10,000, constituted, however, the flower of Mourad Bey's army, and formed his left wing. The right of the Mamelukes was supported by the entrenched camp, their left extended towards the Pyramids.

Napoleon has left on record that the French greatly dreaded the impetuous bravery of the Mamelukes. Their horsemanship, skill in the use of arms, equipment, and valour rendered them, considered individually, the most formidable warriors in the world; and so marked was their superiority in these respects to the French soldiers, that Napoleon has stated that "two Mamelukes could make head against three Frenchmen!"¹ Discipline, which enables men to combine, was the one thing wanting to render the Mamelukes irresistible on the field of battle; and without this they were doomed to defeat when matched against regular troops in the battle of the Pyramids. Napoleon took up a position with his left wing supported by the Nile,

¹ Montholon's "History of Captivity of Napoleon."

his right by a large village; and, after reconnoitring the enemy's camp, he determined to prolong his right wing, which was commanded by Desaix, to follow the movement of this wing with the whole army, and thus by a flank march to pass by the entrenched camp. Mourad Bey observed this manœuvre, and judging that his only chance of success lay in arresting it, he moved against Desaix at the head of two-thirds of the Mamelukes to the number of between 6,000 and 7,000 horsemen. The French received the attack in squares, but so rapid was the charge and so fierce the onslaught of the advanced guard of the Mamelukes, that the square in which was Desaix was thrown into disorder. The advanced guard, however, was not numerous; a few minutes elapsed before the arrival of the main body, and this gave the French time to close their ranks.

Nothing could exceed the bravery displayed by the Mamelukes in their vain efforts to penetrate the squares. Approaching under a heavy fire to within twenty yards, they discharged their carabines and pistols at the enemy; and finding that their terrified steeds would not advance nearer, they turned their horses' heads away from the squares, and attempted by reining back to break the ranks of the French. Individual heroism, however, can never compensate for the lack of order and of combined action; and after suffering heavy losses, the Mamelukes fell back in great disorder. So great was the confusion that they divided into two bodies; one of these, numbering 2,500 men, with Mourad Bey retired to Ghizeh; the other fell back on the entrenched camp. Thus the Commander-in-Chief himself set an example of the effects of indiscipline by separating himself from his army at a critical moment. Napoleon detached two battalions to occupy a defile which lay between the camp and Ghizeh; and thus closed this line of retreat to the main body of his opponents, and simultaneously cut off Mourad Bey from the bulk of his army. At the same time the French advanced against the camp.

The defenders of the camp still greatly outnumbered the French, as they had suffered little. All the infantry and a third of the redoubtable Mamelukes, not having been engaged, were practically intact; and under such circumstances a disciplined army would have still had a hope of victory; but want of cohesion rendered them unable to combine for action, and hence their numbers and individual valour were of no avail. Finding themselves between the French and the Nile, they thought only of making good their retreat across the latter. Some secured boats, many others were drowned in attempting to swim, and it is estimated that 5,000 Mamelukes alone thus lost their lives; the sacrifice of life from the whole army fully reaching 10,000 men.¹

(b.) *The Battle of Meeanee*.—The battle of Meeanee offers, perhaps, the most striking example in modern times of the triumph of a small disciplined army over brave but undisciplined opponents having great numerical superiority.

¹ The foregoing is compiled from the following: Montholon's "History of Captivity of Napoleon." Scott's "Life of Napoleon." Long's "France and its Revolutions."

Sir Charles Napier was in command of the British forces in Scinde, and his advanced guard discovered the enemy's camp at about 8 A.M. on the 17th February, 1843. The Beloochees numbered 35,000 men, of whom 5,000 were cavalry, they had fifteen guns, and as the events of the battle proved, they were brave to a fault, and were filled with enthusiasm by the consciousness of former successes. Their infantry was strongly posted in a skilfully prepared position along the dry bed of the river Phullalah (Fullailu), the bank of which served as a natural rampart, and sloped towards the open plain in front. The Beloochee artillery was divided into two masses, which were placed on the flanks of the line.

The wings rested on dense woods, which the enemy had occupied and prepared for defence, and which extended on each side of the plain, over which the British forces were obliged to advance, and thus enabled the Beloochees to threaten their flanks.

Sir Charles Napier's army was reduced to 2,400 men; his only European battalion was the 22nd Regiment, about 500 strong, the rest of his force being composed of Sepoys led by English Officers. His artillery consisted of twelve guns. It may here be remarked that at Meeanee, as at every other battle gained by British armies in India, the Anglo-Indian troops were not rendered homogeneous by ties of kinship or race, but by the bonds of discipline alone.

After reconnoitring the enemy's position, Sir Charles Napier came to the conclusion that their flanks were so secure that any turning movement was out of the question, and the General therefore determined on a frontal attack.

He turned his baggage into a kind of fort, which was garrisoned by 400 men; and his rear was, by this means, partially protected, but at the same time the fighting strength of his army was reduced to scarcely 2,000 men: and having drawn up this little force in an echelon, he gave orders for an advance which was made under a heavy fire.

The wood on the British right was bounded by a wall, in the middle of which was an opening. This wood was occupied by 6,000 Beloochees, but owing to the height of the boundary wall and the fact that it had not been prepared for defence, the enemy could not fire over it.

General Napier, observing this, at once pushed a company of the 22nd through the opening in the wall, and ordered them to hold it to the last. This stroke met with complete success, and by it eighty English soldiers were enabled for three hours to paralyze the action of 6,000 Belooches.

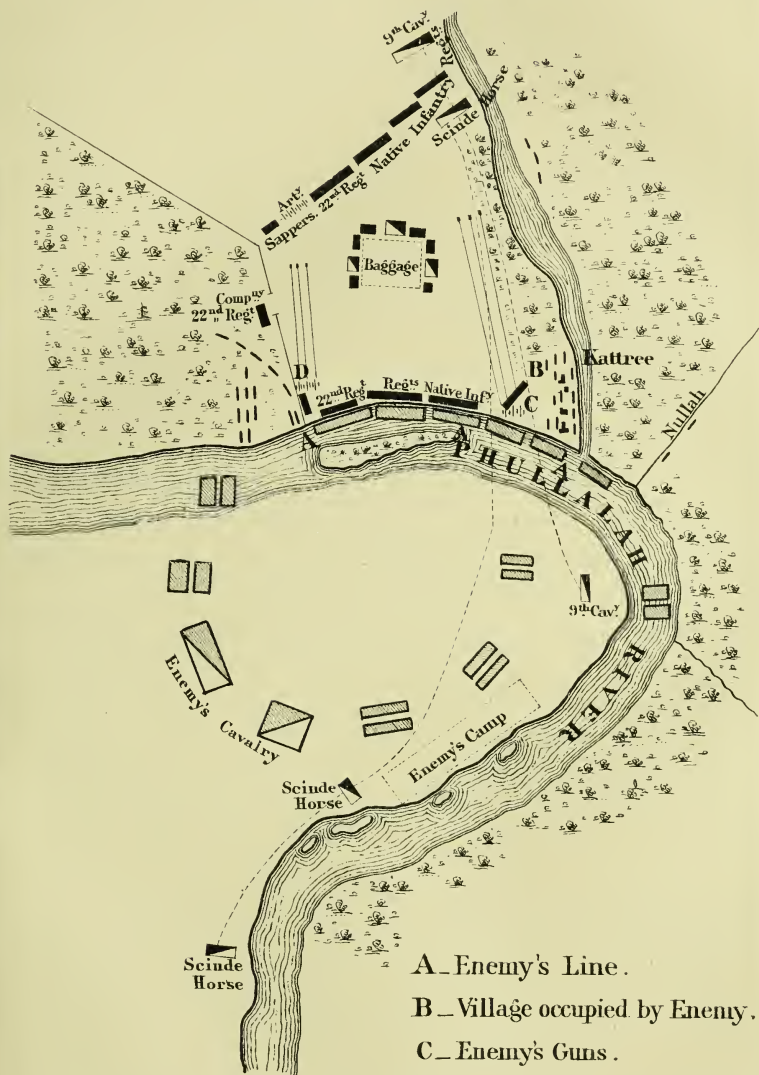
Without doubt the conception of this idea was due to the genius of the British General, but its success depended on two things: first on the wonderful confidence conferred by discipline, which enabled a company to confront an army, and second on the absence of the capacity for combined action which characterizes undisciplined bodies, and which rendered 6,000 brave men helpless in the presence of eighty.

When the British had advanced to within 100 yards of the Phul-

BATTLE OF MEEANEE.

British shown thus —

Enemy —



A—Enemy's Line.

B—Village occupied by Enemy.

C—Enemy's Guns.

D—do.

lalah, Sir Charles Napier gave the order to charge. The enemy received the advancing line with a volley, in spite of which the 22nd quickly gained the crest of the bank, but there, "thick as standing corn and gorgeous as a field of flowers, stood the Belooches in their many-coloured garments and turbans; they filled the broad bed of the Phullalah, they clustered on both banks, and covered the plain beyond. Guarding their heads with their large dark shields, they shook their sharp swords beaming in the sun, their shouts rolled like a peal of thunder, as with frantic gestures they rushed forwards, and full against the front of the 22nd dashed with demoniac strength and ferocity."¹

The battle raged for three hours and a half, the opposing armies advancing to within three yards of each other, and sometimes intermingling. At last Sir Charles Napier ordered the cavalry to charge the enemy's right. Making their way by the village of Kattree, the native troopers passed through the Beloochee guns on that flank: the 9th Bengal Cavalry charged the enemy's infantry, whilst the Scinde Horse fell on their camp and engaged their cavalry.

Slowly and unwillingly the enemy now gave way and fell back; and at the same time the large force, which had during the whole battle been contained by one company of the 22nd, evacuated the wood on the right of the Anglo-Indian army, and joined the main body of the Beloochees, which retreated, leaving 6,000 men dead or dying on the field, and abandoning the whole of their guns, stores, and baggage. The loss of the British Army amounted to twenty Officers and 250 men killed and wounded.²

Undoubtedly this brilliant victory was attributable in part to the skill and distinguished ability of Sir Charles Napier; but not even the genius of a Wellington or of a Napoleon could make 2,000 men victorious over 35,000, unless the victors possessed some great inherent superiority over their antagonists.

The Beloochees were certainly not wanting in courage, and their dispositions were on the whole skilfully made; but their attitude throughout was characterized by an absence of sustained effort, with any object beyond that of offering a blind resistance, and by an incapacity for assuming the initiative, which arose from the want of that concert in action of which discipline is the parent. Want of discipline rendered the Beloochees unable to combine their efforts, and hence alone prevented them from positively mobbing their opponents.

As we have seen, the Beloochees, recognizing the advantage of a flank attack, had massed 6,000 men in the wood on the British right; but the unexpected appearance of a single company checked these at the beginning of the action, and this large force hesitated, during three hours, to take the initiative against a little band whom they might have annihilated by a single rush.

Again, at the end of the battle, the appearance of 500 Anglo-

¹ Major-General W. Napier: "Conquest of Scinde."

² "Conquest of Scinde," and "Life and Opinions of General Sir Charles Napier," by Major-General W. Napier.

Indian cavalry on their flank produced a paralyzing effect on the Beloochee Army, although their own cavalry, to the number of 5,000 men, were at hand, and might have ridden over the British squadrons with ease.

At the Pyramids and at Meeanee, it may perhaps be said, the victors were opposed by bodies of men who were inferior not only from their want of discipline, but also from the absence, throughout their ranks, of any regular organization.

Campaign of 1870-71 (latter portion).—In the latter part of the Campaign of 1870-71, however, the masses brought together by the French Republic were organized into companies, battalions, brigades, &c., in a similar manner to the German Army; but the encounters which took place between these armies were almost invariably as disastrous to the French as the Pyramids and Meeanee were to the Mamelukes and Beloochees; the principal reason for this being that the French levies were rapidly assembled and hurriedly trained, and hence were admittedly wanting in that discipline which was the most striking characteristic of the German invaders.

The French had four large armies in the field, all of which were, in conjunction with the garrison of Paris, to act simultaneously against the Germans. Each of these armies was encountered by a numerically inferior German force, and each of them was finally defeated with heavy loss. It is estimated that in these battles the French suffered to the extent of 40,000 men killed and wounded, 67,000 prisoners, and 80,000 under Bourbaki driven over the Swiss frontier; making a total loss of 187,000, as against 15,000 inflicted on the Germans.

Battle on the Lisaine.—Perhaps the most remarkable of these encounters, if discrepancy in the numbers of the contending armies be considered, was the Battle on the Lisaine on the 15th, 16th, and 17th January, 1871, between the forces of Von Werder and Bourbaki.

Bourbaki's army consisted (approximately) of 120,000 men and 320 guns. To oppose him and, at the same time, cover the siege of Belfort, which contained a garrison of 17,000, Von Werder had but 45,000 men and 146 guns. The latter General took up a position, carefully prepared for defence by entrenchments, &c., along the River Lisaine, which runs from north to south 5 or 6 miles to the west of Belfort. His right was at Chenebier, his centre at Héricourt, and his left at Montbéliard.

On the morning of the 15th January, Bourbaki attacked Montbéliard with the 15th Army Corps, and Héricourt with the 20th and 24th Corps. He appears, however, to have attached the chief importance to a flank movement which he had directed the 18th Corps and the Division Crémier to make against the German right; and by which he hoped that the enemy's line might be turned. But here the absence of order and discipline amongst the French Officers and Staff made itself felt, and prevented the fulfilment of Bourbaki's scheme.

The French Commander-in-Chief drew special attention in his orders to the necessity of the different columns keeping clear of each

other; and he expressly directed Cr  mer to follow the direct route from Lure to H  ricourt for as short a time as possible, so as to avoid coming into collision with the left of the 18th Corps, and Bourbaki further added that, with this object in view, Cr  mer was if possible to leave the road in question before reaching Beverne, and that he was to subordinate his action to that of the 18th Corps. Nevertheless, in order to facilitate his own advance, General Cr  mer used the H  ricourt high road for a considerable distance, and thereby, after crossing the line of the rearmost Division of the 18th Corps at Lyoffans, came into collision at Beverne with the left wing of the same corps. Earlier in the night the Divisions of the 18th Corps also came into collision with each other.

The result of this failure to carry out the Commander-in-Chief's orders was that great loss of time and confusion were occasioned in the execution of the general movement; and eventually the troops did not arrive in front of Chagey until nearly 2 P.M. on the 15th January instead of 6 A.M., which was the hour named by Bourbaki.

It was then discovered that the assumption that the right of Von Werder's line could be turned by a march on Chagey was erroneous, and that, as the position of the defenders extended further north, a longer *d  tour* must be made.

The series of mishaps which attended this flank movement were, in part, attributable to the severe weather and to the half-starved condition of the French troops, which rendered them incapable of rapid marching; at the same time, it can scarcely be doubted that if the discipline amongst the commissioned ranks of the French Army had been equal to that of their opponents, much delay and fatigue would have been avoided; and hence that the chances of success would have been materially augmented.

On the 16th the French succeeded in capturing Chenebier, but made no attempt to follow up their success; and three attacks were also directed against H  ricourt, but without any result; and the French infantry opposite Montb  liard remained passive throughout the day.

Before daybreak on the 17th January the Germans surprised the French troops occupying Courchamp, a village near Chenebier, and recaptured the village. During the day Bourbaki made a general attack along the whole line, but was defeated at every point; and he thereupon determined to abandon further offensive operations, and he accordingly withdrew his army on the next day.

The losses of the French in the three days' fighting amounted to nearly 8,000 men, those of the Germans to but 1,646.¹

The French soldiers who took part in the Battle on the Lisaine had little discipline, and their Officers, both Staff and regimental, appear, as a rule, to have been as deficient in this respect as their men.

The troops were rendered even more inefficient than would other-

¹ "The Franco-German War;" translated from the German official account by Major F. C. H. Clarke.

wise have been the case by the hardships to which they were exposed. In several instances, whole Divisions were kept without fires and under arms throughout the night, from an exaggerated fear of surprise; and it is difficult to believe but that, if the confidence and mutual reliance which arises from discipline had existed through all ranks, much of the suffering thus inflicted would have been avoided.

In conclusion, it may be remarked that whereas in the perfectly disciplined German Army all ranks contributed to the utmost in carrying out their General's plans, the fighting of the French, on the contrary, was to a great extent dependent on the Commander-in-Chief's presence, a sure sign that discipline in its highest form did not exist. The consequence of this was that the French attacks were made without combination, and in a desultory and half-hearted fashion, that a lack of enterprise was shown, as in the failure to follow up the attack on and capture of Chenebier, and, finally, that the plans of the French General failed as much from lack of concert in their execution as from any other cause.

2. *Steadfast Courage of Disciplined Troops, and Liability to Panic of Undisciplined Troops.*

EXAMPLES: (a.) *Battle of Plassey*.—Passing to the second characteristic which distinguishes disciplined over undisciplined troops, I venture to think that history contains no more splendid example of disciplined courage as opposed to undisciplined panic than the advance of Clive to Plassey with his miniature army on the 22nd June, 1757, and the disordered retreat before him of the hosts of Suraj-u-Dowlah on the following day.

The Anglo-Indian Army took up their position late in the evening in a mango grove near Plassey, and within a mile of the enemy. Clive's total force only numbered 3,000 men, of whom but 1,000 were Europeans, principally men of the 39th Regiment, the remainder being sepoys disciplined in the English manner, and commanded by English Officers. His artillery was limited to eight field-guns.

At daybreak, on the 23rd June, the hordes of Suraj-u-Dowlah poured forth from their camp to the number of about 60,000 men, of whom 15,000 were cavalry. There were also fifty pieces of artillery mounted on travelling platforms, and drawn by oxen; and Suraj-u-Dowlah had in addition four field-guns equipped in European fashion, and served by forty French gunners. His cavalry was composed of men from the north of India well armed, well mounted, and brave; but in this formidable force "the bond of discipline was wanting, and placing no reliance one upon another their very multitude became to them a source of weakness."¹

The Nabob's artillery began the battle with a noisy but ineffectual cannonade, the guns being badly served. The fire from the English artillery produced such a moral effect on the crowded masses of Indians, that Clive soon discovered that his guns alone were sufficient

¹ Rev. G. R. Gleig: "Life of Robert, First Lord Clive."

to keep his cowardly enemy in check. Owing, however, to the smallness of his force, he did not as yet deem it prudent to assume the offensive. About noon, a heavy shower of rain damaged the ammunition of the enemy's artillery to such an extent as to render their guns almost useless; and, at about the same hour, a cannon ball from the English guns mortally wounded Meer Murdeen, one of the best and most trusted Officers in Suraj-u-Dowlah's service.

This event induced the Nabob to order a general retreat, a manœuvre which all ranks of his army were apparently very ready to execute. Soon the mighty host, having sustained a loss of but 500 men, and having slain only 22 of its opponents, was retiring in ignominious flight before the British force, which it outnumbered by twenty to one, and with which it had never dared to come to close quarters. As if still further to accentuate the courage of discipline, the little band of forty French artillerymen now alone held their ground, and ventured for a few minutes to confront the conquerors of an army of 60,000 men; but they were sharply attacked, and quickly compelled to abandon their guns, and join in the general flight.¹

At the Battle of Plassey, no doubt other influences beyond want of discipline contributed to produce panic in the ranks of the vanquished; as, for example, their entire want of tactical skill, the absence of any organization however rough, and the fact that the conquerors belonged to a dominant race, and hence had the advantage conferred by prestige. It will be seen, however, from the examples which follow, that if the discipline of a well-organized European army becomes even temporarily affected, it at once becomes liable to panics as disgraceful as those which characterize the disorderly rabbles of Eastern potentates.

(b.) *Encounters between Austrians and French in April, 1792.*—Thus, at the beginning of the Campaign of 1792, it is admitted by all writers on the subject that, owing to the general subversion of all authority at the Revolution, and from other causes of which I shall speak later, discipline had almost ceased to exist in the French Army. In April of that year, Tournay was held by the Austrians, and about the 28th of that month, General Dillon advanced with 4,000 French troops from Lille to Bessieux, with the intention of seizing Tournay. His advance was covered by his cavalry, of which he appears to have had a considerable force.

About 900 Austrians of the garrison of Tournay showed themselves on the approach of the French, but without, it is said, firing a single shot. The sight of their enemies even was more than the latter could stand. The French cavalry, who were in front, uttered frantic cries of terror, and immediately galloped back to Lille, followed by the rest of the army; all the artillery and baggage being abandoned to the Austrians.

Dillon followed his cowardly soldiers back to Lille, and was murdered by them in the streets of that town, his Commanding Engineer, Berthois, being killed at his side; and their lifeless bodies

¹ Compiled from "Life of Robert, First Lord Clive," by Rev. G. R. Gleig, and "Life of Lord Clive," by Sir J. Malcolm.

were treated with horrible indignity.¹ Thus the French troops sought to avenge on their leaders the want of confidence in themselves, which arose from the absence of discipline from their ranks; and thus barbarous cruelty, as well as contemptible cowardice, quickly followed in the steps of indiscipline.

The above was by no means an isolated example. Disgraceful panics of a similar character continued to be frequent during this campaign, until discipline had once more been established in the French ranks by Dumouriez, and by other Generals brought forth by the Revolution. Then the remarkable spectacle was presented to the world of the same soldiers who, when without discipline, had fled in abject terror at the approach of an enemy, marching in triumph from one end of Europe to the other, after gaining some of the most brilliant victories of modern times.

Again, in the Peninsular War the half-disciplined Spanish troops were utterly unreliable, and frequently displayed the grossest cowardice. I will quote but one instance out of many which might be given.

(c.) *Battle in the Somosierra*.—On the 30th November, 1808, 12,000 Spaniards, under St. Juan, were skilfully posted in a very strong position in the Somosierra. Napoleon, who appears fully to have understood the troops he had to deal with, ordered two or three squadrons of Polish Lancers to charge up the pass, the ascent of which was very steep. Thereupon the Spanish troops fired one volley and fled, leaving guns, ammunition, and baggage. "It is almost incredible," says Sir William Napier,² "that a position nearly impregnable, and defended by 12,000 men, should, from a deliberate sense of danger, be abandoned to the wild charge of a few squadrons which two companies of good infantry would have effectually stopped." The peculiar untrustworthiness of badly disciplined troops was well exemplified on this occasion, as a portion of the Spanish Army then engaged had previously been victorious over the French.

As if to complete the picture of their undisciplined cowardice, the Spanish troops who had thus shamefully fled afterwards murdered their General, and fixed his mangled body to a tree.

Passing to a more recent period, it will be found that somewhat similar instances of unreasoning panic frequently occurred amongst the raw and undisciplined levies with which the French Republic attempted to check the German invasion during the latter part of the Campaign of 1870–71.

(d.) *Engagement between Germans and French Garde Mobile in November, 1870*.—On the 26th November, 1870, whilst Garibaldi's Division was engaged with the Germans near Dijon, the French Garde Mobile who were in reserve were so terrified by the sound of rifle bullets passing over their heads, that although not a man was hit, yet they either threw themselves flat on the ground, or took refuge in the neighbouring ditches. So blind was their terror that, in prostrating

¹ Lamartine: "History of the Girondists." Long: "France and its Revolutions."

² "History of the War in the Peninsula."

themselves, they wounded each other with their bayonets, which were fixed, thus adding to the disorder.

After a time they were persuaded to rise, but immediately on doing so they loaded their rifles contrary to their orders, and opened fire; and as the Mobiles were in reserve, and therefore had a line of their own friends at some distance in front of them, these received the full effects of the discharge.

The French fighting line had, up to this time, maintained the contest with the Germans with courage; but finding that they were now being fired at from the rear, they very naturally imagined that the enemy had penetrated between them and their reserves, and they began to retreat with a view to rejoining the latter. The sight of these men running towards them proved the last straw to the Garde Mobile; they "turned tail and fled. Persuasion and menaces were alike powerless to bring them back. When kind words had failed, the Officers of the Staff drew their swords, and struck them over the back with the flat part, but the cowardly mass dodged them, and fled into the fields."¹ As a consequence of this panic, the whole army was compelled to fall back. Yet this cowardly rabble belonged to a nation whose soldiers, when acting with the mutual reliance arising from discipline, have invariably proved themselves to be as brave, perhaps braver, than any in the world.

On the other hand, on the rare occasions during this campaign that the perfectly disciplined German troops were compelled to fall back before the French, their retreat was characterized by the most admirable coolness, and they availed themselves of every advantage of ground to check pursuit. An example, on a small scale, of this occurred during the operations in which the panic of the Mobiles above described formed an episode.

A portion of the German force was retiring, and a detachment of the 7th Chasseurs d'Afrique started in pursuit, and attempted to press on the retreat. This being observed by the retreating Germans, a party of their infantry took up a position behind a wall, outside the village of Prenois, which the French cavalry were obliged to pass. The German infantry coolly waited until the latter were within a few yards of them, and then poured three volleys into the ranks of the cavalry in rapid succession, and thus dismounted a considerable number, and threw the rest in confusion.

(e.) *Campaign of 1877: Unreliable Behaviour of Turkish Irregulars.*—Passing to the Russo-Turkish Campaign of 1877, it appears that the conduct, in the presence of the enemy, of the undisciplined bands of irregulars attached to the Turkish armies was always untrustworthy in the extreme. Great personal bravery and disregard for danger were no doubt frequently exhibited; and individual Circassians would ride up and down alone within view and fire of an advancing Russian force, would discharge their rifles at the approaching enemy with the utmost coolness, and would finally retire after treating their foes with perfect indifference. This admirable behaviour, however,

¹ War correspondence of the "Daily News."

was by no means maintained by the Circassians if required to act together in large bodies; for when this was the case they were most unreliable, and could not be trusted in front of the Russian regular troops; a similar untrustworthiness characterized the conduct of the other irregulars who acted with the Turks. During the engagement between the Turks and Russians near Boditzka, General Valentine Baker attempted, pending the arrival of the Turkish regular troops, to utilize some Bashi-Bazouks, in order to check the Russian advance. With this object in view he posted these men along the edge of a wood. As soon, however, as "the bullets of the Cossack skirmishers begun to fall amongst us, the cowardly wretches bolted to a man, and rushed off along the road in the direction of Kovatza."¹

Yet these men were simply armed civilians of the same race as the regular Turkish troops, who throughout the campaign withstood the Russian onslaughts with valour and determination, and hence their cowardice must be attributed to their want of discipline alone.

Danger of Excess of Undisciplined Valour.—Before leaving this part of the subject, it may be remarked that an excess of undisciplined valour may lead to results as disastrous as those which have flowed from undisciplined panic. This is especially the case when troops have been induced to follow up a temporary success with too great impetuosity and without support.

Opinion of the Duke of Wellington.—In commenting on an incident of this kind, the Duke of Wellington remarks: "The undisciplined ardour of the — Dragoons and — Regiment of Portuguese Cavalry is not of the description of the determined bravery and steadiness of soldiers confident in their discipline and in their Officers. Their conduct was that of a rabble, galloping as fast as their horses could carry them over a plain, after an enemy to whom they could do no mischief. . . . I add my entire conviction that if the enemy could have thrown out of Badajoz only 100 men, regularly formed, they would have driven back these two regiments in equal haste and disorder."²

3. *Attention to Details, &c., of Disciplined Troops, and Carelessness of Undisciplined Troops, contrasted.*

I will now proceed to the third point at which disciplined troops have shown themselves to be superior to undisciplined armies.

It is obvious that there can be no regularity or method if order and subordination are wanting, and many instances can be quoted of failure and disaster the fruits of the neglect of detail and general carelessness which, together with actual disobedience, are usually displayed by undisciplined troops.³

¹ "War in Bulgaria," by Lieut.-General Baker Pasha.

² "Despatches and General Orders of the Duke of Wellington," by Lieut.-Col. Greenwood.

³ The examples which follow are selected from Napier's "History of the Peninsular War." Adam's "Great Campaigns." "Franco-German War" official account. Hozier's "Russo-Turkish War." General Valentine Baker's "War in Bulgaria." Journals of the R.U.S.I., &c.

EXAMPLES : (a.) *Operations of French Army under Duhesme in 1808 in the Peninsula.*—In 1808 the French Army in the Peninsula consisted, with the exception of a few battalions, of raw and undisciplined levies; the consequence of which was that their operations were attended with frequent checks and failures which resulted from carelessness and want of precision in their execution.

These failures cannot be attributed to any neglect on the part of Duhesme, who was in command, for we have the evidence of Napoleon that he was an Officer of great energy and intelligence.

On the 3rd of June, 1808, a force of 3,000 men marched from Barcelona with the intention of moving to Manresa. It was well known that the "Somatenes" or armed peasants were assembling in great numbers in the neighbourhood, yet the column marched without an advanced guard or military precautions of any kind, with the obvious result that the French troops were surprised by the peasantry at the Pass of Bruch, and narrowly escaped destruction. A few weeks after the assaults on Girona were repulsed owing to the omission to carry scaling ladders, and to the confusion in the French attacking columns.

(b.) *Incidents during Retreat of British Army on Coruña.*—During Sir John Moore's retreat on Coruña, at the end of the same year, dislike to retreating and bad weather combined to seriously impair the discipline of the British Army, and a general indifference and carelessness at once became apparent amongst both Officers and men.

When he found that it was necessary to change the direction of his march from Vigo to Coruña, Sir John Moore despatched orders to that effect by an aide-de-camp to one of his subordinate Generals. The latter, although he well knew the vital importance of these orders, yet passed them on to General Fraser by a private dragoon who got drunk and lost the despatch. The carelessness by which orders of such moment were entrusted to so unreliable a messenger had a disastrous result. Fraser remained in ignorance of the change of plan for several days, and hence performed a toilsome and unnecessary march during which he lost more than 400 men.

During the same retreat an Officer was placed in charge of some cars loaded with dollars to the value of 25,000*l.* The bullocks dragging this treasure had become exhausted, and the Officer in charge of it was told where fresh teams could be procured; but here again the fatal consequences which result from the absence of the highest form of discipline made themselves felt. The Officer, indifferent to his duty, neglected to obtain fresh cattle, and hence the treasure had to be abandoned to the enemy very shortly afterwards.

(c.) *Double Retreat of the Anglo-Portuguese Army from Burgos and Madrid in 1812.*—Again, in the autumn of 1812, the double retreat of the Anglo-Portuguese Army from Burgos and Madrid produced the usual effect on discipline, which in most regiments became very defective.

Soon after one column had left the Tagus, a number of men of the rear-guard, which was commanded by Cole, contrived to stray away from the ranks, and breaking into the cellars at Valdermoro became

hopelessly drunk; in this condition 250 of them were captured by the French.

In November the line of retreat lay near the Matilla stream, through a forest containing large droves of pigs.

In spite of positive orders to the contrary, hundreds of soldiers quitted the ranks to shoot these animals; the Army being thus placed, to a certain extent, at the mercy of the French. Fortunately the latter did not press the march of the Allies, but contented themselves with capturing the stragglers, of whom in a short time they took more than 2,000 prisoners.

The advantages conferred by discipline were remarkably illustrated during this retreat; for whilst on the one hand, owing to the above-described and other irregularities, the French captured altogether more than 3,500 prisoners; on the other hand, the Guards and Light Divisions, which had preserved their discipline, held well together and scarcely lost thirty men beyond those killed in battle.

The foregoing are examples of wide-spread indiscipline and its results, but the irregularities of individuals, even, may be fraught with disastrous consequences.

(d.) *Incident during Campaign of 1813.*—In July, 1813, the French Army, under Soult, had halted at San Estevan, in a deep, narrow valley, and in a few hours would have been completely surrounded by the Allies, and compelled to surrender. All that was necessary for the success of this plan was that Soult should be kept in ignorance of the proximity of the enemy. With this object the Duke of Wellington gave strict orders against straggling: but at the critical moment three marauding English soldiers strayed near the French camp, and were promptly made prisoners.

Thus warned, the French speedily beat to arms, and within half an hour of the alarm being given, Soult's columns began to march out of San Estevan. "Thus the disobedience of three plundering knaves, unworthy of the name of soldiers, deprived one consummate Commander of the most splendid success, and saved another from the most terrible disaster."¹

(e.) *Irregularities of Spanish Troops in Peninsula.*—During the whole course of the Peninsular War, the native Spanish armies were utterly without discipline, and hence their manœuvres presented the spectacle rather of a burlesque than of serious military operations.

The simplest precautions were systematically disregarded, and nothing appears to have interested the Spaniards less than the movements, numbers, and intentions of their opponents. They firmly declined to fight, or perform any other military duty, except at times and places agreeable to themselves; and whilst, on the one hand, they never gave information to their own Generals, on the other, every movement of the Spanish troops was well known to the French. In 1809, Bernardin Freire took command of a Spanish army of 15,000 men at Braga, and attempted to establish outposts and also to check the habit, which existed amongst the Spanish soldiers, of firing

¹ Napier's "History of the Peninsular War."

off their ammunition when walking about the streets and roads. These reforms were regarded as an unwarrantable interference with the liberty of the subject, and the offending General was promptly put to death by his soldiers.

To add to their other enormities the Spanish cavalry, in August, 1809, captured the supplies destined for their English allies, and actually shot down the foragers as if they had been the enemy.

The result of all these disorders and irregularities was that the Spanish troops blundered from one disgraceful disaster to another, nothing being regular in their operations except the recurring defeats.

(f.) *Operations of British Light Division in Peninsula in 1810.*—It will be found that the behaviour of the men of the perfectly disciplined English Light Division presented a remarkable contrast in every particular to that of the Spaniards. "Long and carefully disciplined by Sir John Moore, they came to the field with such a knowledge of arms, that six years of warfare could not detect a flaw in their system."¹

In 1810, General Craufurd with the Light Division, reinforced by other troops to about 4,000, watched the line of the Aqueda from Escalhon on the left to Navas Frias on the right—a distance of nearly 25 miles. Yet—although there were only about 170 men available to watch each mile of front—they never allowed themselves to be surprised; and this notwithstanding the fact that, owing to sudden changes of level, the Aqueda formed a most unreliable barrier, as it would frequently, in a single night, become fordable at places previously impassable. This peculiarity rendered it often necessary that the outposts should be concentrated; and so marvellous are the order and precision produced by discipline, that a quarter of an hour sufficed for the troops to form up in order of battle at the alarm posts with baggage loaded in rear in readiness for immediate movement.

(g.) *Novara Campaign of 1849.*—The Novara Campaign of 1849 affords an apt illustration, both of the advantages conferred by the existence of a perfect and willing discipline amongst the higher ranks of an army, and of the miscarriages and failures which necessarily flow from the absence of such discipline.

The Austrian Commander-in-Chief, Count Radetzky, although 82 years of age, still possessed considerable activity, both mentally and physically. An agreeable and even fascinating manner, added to the devotion and respect which his great age and long and distinguished career in the Austrian Army naturally excited, and the existence of such sentiments amongst all ranks, was a sure guarantee of the existence of discipline.

The Commander-in-Chief of the Sardinian Army had the misfortune to occupy a position differing from that of Radetzky in every respect. A Polish adventurer, and only appointed to command the Sardinian forces at the beginning of the campaign, Chrzanowsky had all the obstacles to contend with which naturally present themselves in the path of a foreigner and stranger suddenly raised to such a

¹ Napier's "History of the Peninsular War."

position. Ignorant of the character—of the language even—of his subordinates, Chrzanowsky's difficulties were further increased by the resentment naturally entertained against him by the numerous Officers who had been superseded by his appointment. Every order issued by him was severely criticized, and, if possible, disobeyed, or at most unwillingly and grudgingly carried out.

The Sardinian Army numbered 85,000 men with 150 guns, and was divided into seven Divisions and two independent brigades. Chrzanowski determined to invade Lombardy and occupy Milan; and he accordingly massed five Divisions and a brigade between Novara and the Ticinus; and a sixth Division, under La Marmora, was ordered to move on Parma so as to be able to co-operate with the main army if it should continue its advance to the Mincio. Chrzanowski foresaw that it was possible that the Austrians would themselves attempt to invade Piedmont, and that, in such a case, they would probably attempt the passage of the Ticinus at Pavia; and he therefore ordered a Division, under command of Ramorino, to take post at La Cava, which is situated on heights near the river bank, and opposite Pavia. These heights were capable of being strongly defended, and would directly obstruct the advance of the invading columns.

If no hostile movement was perceptible Ramorino was, if possible, to capture Pavia; but if the Austrians attempted to debouch from Pavia into Sardinian territory, Ramorino was ordered to stoutly oppose them; and if compelled to fall back he was to retire upon Mortara or San Nazzaro, whence he could regain communication with the other Divisions who would be warned by the firing. Ramorino, however, entirely disregarded these orders and remained inactive with his Division on the south bank of the Po.

What Chrzanowsky believed to be possible actually took place.

On the 20th March, Radetzky invaded Sardinian territory by way of Pavia with 68,000 men, and, owing to the disobedience of Ramorino, he was able to carry out, unopposed, the critical and dangerous undertaking of crossing the frontier river.

On the following day the absence of discipline amongst the higher ranks of the Sardinian Army again produced evil results.

Chrzanowsky on hearing of the passage of the Ticinus by the Austrians ordered two Divisions, under Durando and the Duke of Savoy, to occupy Mortara. Durando was directed to take up a strong position about three miles in advance of the town, whilst the troops under the Duke of Savoy were to be in reserve. Durando disobeyed these instructions, and occupied a position only one mile from Mortara; his only line of retreat thus passed through the streets of that town. The reserve could only move forward to his support through the streets of Mortara; and hence, when Durando was compelled by the Austrians to retire on the 21st March, his troops in falling back blocked the advance of the Duke of Savoy and prevented his occupying Mortara. The Duke was therefore compelled to withdraw the reserve, and abandon the town to the Austrians.

Mortara was the key of Chrzanowsky's line of communication

with his base at Turin; and its occupation by the enemy, which was due to the disobedience of Durando, seriously compromised the whole Sardinian Army. With the careless indifference of indiscipline neither Durando nor Savoy made any report of their defeat to their Commander-in-Chief, and the latter learnt by accident of a combat which had vitally influenced the whole campaign. Whilst in the Sardinian Army the insubordination and disobedience of the Generals were thus bringing the plans of the Commander-in-Chief to naught, on the side of the Austrians, on the contrary, the discipline of all ranks left little to be desired; and the contrast between the contending armies in this respect mainly contributed to the final overthrow of the Sardinians a few days later at the Battle of Novaro.

(h.) *Campaign of 1870.*—The discipline of the German Army in 1870 had reached the highest possible standard, the result of long years of national training and self-denial. The vulgar forms of insubordination, such as have been previously described, were almost entirely absent; and owing to the high pitch of intellectual discipline which prevailed, all ranks had but one object in view, the successful issue of the operations in which the armies were engaged. This sentiment being the mainspring of their actions, each Officer, non-commissioned officer, and soldier exerted himself to the utmost; and was ready, if necessary, to sacrifice himself in the fulfilment of his duty. Hence the advance of the German hosts into France in the summer of 1870, and their subsequent operations in the seven months' campaign which followed, must always be quoted as splendid examples of the triumph of disciplined force.

The perfect regularity and precision which spring from a disciplined attention to detail in the execution of all operations, coupled with the zealous spirit of duty which pervaded all ranks, enabled the German Commanders to count, with the certainty of a chess-player handling his pieces, on the support in their plans of the most distant portion of the army.

The methodical precision which characterized the German operations was the more striking from the fact that it existed side by side with a marked spirit of enterprise and daring. Thus at the beginning of the campaign a Staff Officer with a patrol made his way through the French outposts near Lauterberg, and explored a considerable tract in rear. Eventually, after examining the district for thirty-six hours, the party encountered a superior French force, when at a distance of 10 miles in rear of the French outposts, and sustained some loss. The Staff Officer in charge, however, escaped to the 3rd German Army, with the important intelligence that no large body of French troops existed between Lauterberg and Woerth. Later, a few Uhlans boldly occupied the hostile and important town of Nancy; and although they numbered but thirty men in the presence of thousands of French inhabitants, they seized the railway station, and tore up the rails for some distance, thus inflicting great inconvenience on the enemy.

The above are but two out of many examples which might be

quoted of the daring spirit of enterprise and untiring watchfulness displayed by the German cavalry throughout the campaign.

Space will not allow of my dwelling on the great operations which followed these preliminary enterprises, and from which many lessons on the importance of discipline might be gleaned. The conduct of the campaign by the Germans was throughout remarkable for the same characteristic completeness and precision, and on the very few occasions that a joint in the armour of their discipline became visible, the defect almost invariably arose from excess of zeal ; as, for example, the loss of control over the supports at the Battle of Gravelotte, and their disordered advance and entry without orders into the fighting line.

On the side of the French, whose discipline had been admitted by General Trochu and others to be most defective, all operations were remarkable for neglect of detail and general carelessness, sure precursors of failure and miscarriage. This was specially observable during the disastrous march to Sedan. "The execution of the movement was execrable. Hesitation on the part of the Commanders reigned everywhere ; orders and counter-orders followed unaccountably ; the direction of the march was too often changed ; care for supplies was unattended to ; the movement itself was not definitely marked. The first two marches were excessive, the others puny, and throughout the exposed flank was not covered ; while owing to the ignorance of topography displayed, the order of march was not maintained ; and, lastly, outpost duty was utterly neglected."¹

(i.) *Campaign of 1877.*—Before leaving this portion of the subject it will be well to speak briefly of the Russo-Turkish War of 1877. Large bodies of Circassians and other undisciplined irregulars attached themselves to the Turkish armies at this time, and it might have been supposed that the habits and disposition of these men would have rendered them invaluable for scouting. Such would doubtless have been the case if they could have been properly disciplined ; but owing to the fact that, like the Spanish levies in the Peninsula, they would only carry out their military duties when and where they pleased, it was found that their presence with the armies of the Sultan was worse than useless.

A whimsical illustration of the careless manner in which these irregulars performed the duties allotted to them was afforded during the passage of the Russians across the Balkans in July, 1877. The Turks, apparently believing that a Russian advance along this line was possible, had posted some companies of Nizams at the entrance to the Haïnkoi Pass. These troops were encamped in a valley, and by way of outposts had stationed a party of mounted Bashi-Bazouks on a height in advance of their camp.

On the Russians moving forward, they were observed by the Bashi-Bazouks, who thereupon rode off in another direction, without attempting to warn the Nizams of the approaching danger. The consequence of this was that the Turks were surprised in their

¹ Adam's "Great Campaigns."

tents, and their camp with stores and baggage was easily captured by the Russians.

Owing to the above incident the passage of the Balkans on the Hainkoi line was accomplished by the latter without loss.

4. *Effect of Discipline in preventing Barbarities against Inhabitants of Theatre of War, and results of such Acts if allowed.*

I will now give a few illustrations of the barbarities which invariably attend the operations in the field of undisciplined bodies of men, and of the evil results which react therefrom on the cause of the perpetrators.¹

EXAMPLES : (a.) *War in America in 1777.*—General Burgoyne, who commanded the British forces in America in 1777, had, in an unlucky moment, enlisted the services of several tribes of Red Indians. During the summer of that year the operations of the British Army had been attended with remarkable success, and a belief began to prevail both in England and in America that the American Colonists would soon be compelled to lay down their arms. At this time the employment of Indian allies produced a most evil effect, and contributed in no small degree to the sudden change which was about to pass over the face of affairs.

In spite of the exertions of Burgoyne, the Indians, who were under no sort of discipline, habitually committed the most horrible atrocities ; and it is said that, in some cases at least, American loyalists, as well as persons hostile to the British cause, were the victims of these excesses. The accounts of the massacres perpetrated by these savage auxiliaries were widely circulated amongst the Colonists, and naturally gave rise to a feeling of desperation which reacted disastrously on the fortunes of the British forces, and mainly brought about their overthrow. "The inhabitants of the open and frontier countries had no choice of acting ; they had no means of security left, but by abandoning their habitations and taking up arms. Every man saw the necessity of becoming a temporary soldier, not only for his own security, but for the protection and defence of those connections which are dearer than life itself. Thus an army was poured forth by woods, mountains, and marshes, which in this part were thickly sown with plantations and villages. The Americans recalled their courage ; and when their regular army seemed to be entirely wasted, the spirit of the country produced a much greater and more formidable force."²

(b.) *War in the Peninsula.*—Throughout the Peninsular Campaign the behaviour of the French troops, the standard of whose discipline was usually not high, towards the inhabitants of the theatre of war was characterized by an excessive harshness and brutality which

¹ The following is compiled from—Creasy : "Fifteen Decisive Battles of the World." Napier : "History of War in Peninsula." Gurwood : "Despatches of Duke of Wellington." "Franco-German War : Official account. Hozier's "Russo-Turkish War," &c.

² Burke.

rendered Napoleon's system of forced requisitions even more unbearable than would otherwise have been the case.

The oppressions which the invaders inflicted rendered them the object of the deadly and vindictive hatred of the Spaniards, who retaliated on the French at every favourable opportunity.

The night before the surprise of the latter at Aroyo Molino, every Spaniard in the neighbourhood knew that the Allies under Hill were approaching to attack the French, and might have profited by betraying their advance to the enemy. The detestation excited by the cruelties perpetrated by the French caused the secret to be rigidly kept, and the latter were completely surprised by the Allies and only 600 out of 3,000 escaped.

General Order by Duke of Wellington in July, 1813.—The Duke of Wellington, in a General Order of the 9th July, 1813, attributed the misfortunes which had then overtaken the French to the cruelties which they had inflicted on the inhabitants of the country during their invasion of Spain and Portugal; and there seems to be no doubt that there were considerable grounds for this assertion. On the other hand, certain of the French Generals sometimes succeeded in abating the cruelties practised by their men, by enforcing a higher standard of discipline, and in such cases the result was always beneficial to their military operations. Thus, early in 1809, Soult having adopted a humane and conciliatory attitude towards the inhabitants of Ribidavia, they soon began to return to their houses; and the reprisals against the French arising from the hostility of the peasantry were greatly reduced, whilst at the same time the supply of Soult's troops was rendered easier.

Again, acts of hideous cruelty perpetrated during the storming of Oporto, by the undisciplined defenders, were followed by a prompt and terrible retribution. The French troops on entering one of the principal squares found several of their comrades, who had been made prisoners, bound, and though still alive, with their eyes burst and their tongues torn out. This sight excited a furious rage against the Portuguese amongst the French troops, and in spite of Soult's efforts to stop the carnage, 10,000 Portuguese were slain, whilst the loss of the French did not exceed 500. So eminent an authority as the Duke of Wellington has left numerous records in the shape of general orders and memoranda, that it was his conviction that discipline in an army alone can prevent outrages against the persons and property of the inhabitants of the theatre of war; and, further, that such irregularities invariably lead to the most serious misfortunes. Previous to the advance of the Allied Army into France, the Duke issued an order warning his troops against molesting the inhabitants.

(c.) *Advance of Allied Army under Duke of Wellington into France in 1813-14.*—In November, 1813, however, the Spanish troops, whose discipline appears to have been always bad, availed themselves of the opportunity for marauding; and the French inhabitants, terrified at their excesses, fled from their district; but Wellington was determined to check these outrages at all costs, and his measures with this

object were promptly taken and sternly enforced. He caused all the Spanish marauders who could be captured in the act to be put to death; and although sore pressed for men and daily expecting a battle, he ordered the whole of the Spanish troops to retire from France to their own country.

This decisive and far-seeing policy quickly restored confidence to the French; they returned to their homes, and the good feeling which was thus excited materially facilitated the further operations of the British Army on French territory.

The discipline of the Duke of Wellington's troops during this campaign contrasted very favourably with that of their opponents; and the result was sufficiently striking, for the Duke was able to state, years afterwards, before a Royal Commission, that the French civil population "came home to their houses when the English were to occupy them, having left them when the French were to occupy them!"¹

(d.) *Invasion of France of 1870.*—More than half a century later French soil was again to resound to the tramp of an invading host, moving with the irresistible force of perfect discipline; again were proclamations issued by the chiefs of the invading armies, warning their soldiers against the excesses which have so often disgraced the operations of war; again were the orders of the Generals to find so ready a response from their soldiers, that the spectacle was presented of the inhabitants of the theatre of war dreading the presence of their defenders rather than that of the enemy; and again was an honourable humanity to be rewarded by splendid and well-earned success. Throughout the Campaign of 1870–71 the behaviour of the German troops towards the civil population of the invaded provinces was beyond all praise, and the aspect presented by French towns, during the passage through them of the German invaders, was thus described by an eye-witness. "They do not suffer any of what are technically termed the 'horrors of war.' Young girls stand at the cottage-doors in the villages, or at the street corners in the towns to see the soldiers pass, and are not injured by them. Shops are open in the towns and are not plundered; peaceable citizens go about their business without fear for life or limb."²

When staying in France ten years after the conclusion of the campaign I heard the following related by a French lady, who vouched for its truth. A detachment of German troops had occupied a small French town lying at no great distance from the Channel, and some of the men were billeted on a friend of my informant. During the absence of his comrades one of these soldiers demanded the key of the wine-cellar from the lady of the house, who refused his request; and he thereupon threw her down, and was about to offer further violence when a German Officer fortunately arrived on the scene. The offender was at once made a prisoner, was tried by court-martial, and was shot next morning.

The fact that such testimony in their favour could be given by a

¹ "Wellington Despatches."

² War correspondence of the "Daily News."

hostile witness speaks volumes for the conduct of the German troops. Their disciplined forbearance brought its own reward, and the conviction which soon prevailed amongst the French inhabitants, that they were safe from outrage, provided they abstained from molesting the unwelcome intruders, contributed in no small degree in rendering the task of the Germans less difficult. Who can doubt that, if their path had been marked by cruel outrages and wanton oppression, the difficulty of communicating with and supplying the various parts of their vast and wide-scattered army would have been greatly increased by the active hostility of the inhabitants: and, further, that at the Lisaine and elsewhere the French levies would have been swelled to double the actual numbers by recruits, forced to fly from the occupied provinces, and imbued by the courage of despair by the loss of all that men hold dear?

It is, also, at least possible that, if needless cruelties had been inflicted on the French by their conquerors, a feeling of sympathy might have been excited amongst the other nations of Europe, and a disposition aroused to deny, in some measure, the fruits of their victories to the Germans.

(e.) *Campaigns of 1876-77.*—The operations of the irregulars employed by the Turks in 1876-77 afford an illustration of the barbarities which are usually practised by undisciplined bodies, and of the disadvantages which recoil therefrom on the cause of those whom they serve.

The revolting outrages perpetrated by the Circassians and Bashi-Bazouks on the inhabitants of Batak and other towns and villages, during the suppression of the rising in Bulgaria, estranged the sympathies of Europe from the cause of the Sultan, and brought the whole Turkish Army into great and ill-merited disrepute. In the campaign against the Russians which followed the rising in Bulgaria, Circassians, Bashi-Bazouks, and Kurds maintained their reputation for cold-blooded and purposeless ferocity, and it is probable that more would have been heard of their enormities, if their opponents had been altogether blameless in such matters. The employment, however, by the Russians of undisciplined hordes, who were guilty of similar crimes, rendered them unable to reap the great political capital which would have accrued to them if they could have held up their opponents to reprobation, in the negotiations which followed the conclusion of the campaign.

It may, perhaps, be remarked that between 1757 and 1877, several well-known instances occurred in which undisciplined bodies of men achieved signal triumphs over regularly disciplined troops. If the surrounding circumstances, in such cases, be carefully examined, it will almost invariably be found that the latter were either enormously outnumbered or were placed by peculiarities of ground at a great disadvantage as regards their antagonists.

Circumstances which have sometimes led to the Defeat of Disciplined by Undisciplined Armies.—Napoleon was of opinion that the power of disciplined troops was superior to that of undisciplined bodies of men in the ratio of three to one; or in other words, that a regular army

of, say, 5,000 soldiers ought to hold its own against 15,000 irregulars. It will be found, however, as a rule, that the undisciplined bands that have overthrown regular soldiers in battle have outnumbered the latter in a much higher ratio than that of three to one; and the disparity of numbers has been specially remarkable on several occasions on which English soldiers have met with disaster.

As regards the question of ground, it is obvious that if regular troops are forcing their way through pathless forests or over precipitous rocks, they will be at a disadvantage, whilst so doing, in resisting the attack of an enemy to whom every rood is familiar, and who can avail himself to the utmost of every peculiarity of ground.

On the other hand, on the very rare occasions on which undisciplined levies, not having great numerical superiority or advantage of ground, have overthrown regular and well-disciplined soldiers, the defeat of the latter has been the result either of some gross neglect of military precautions or other tactical error.

The wars of the future will be waged under two novel conditions, which will render necessary an even higher standard of discipline than that which sufficed in the campaigns of the past.

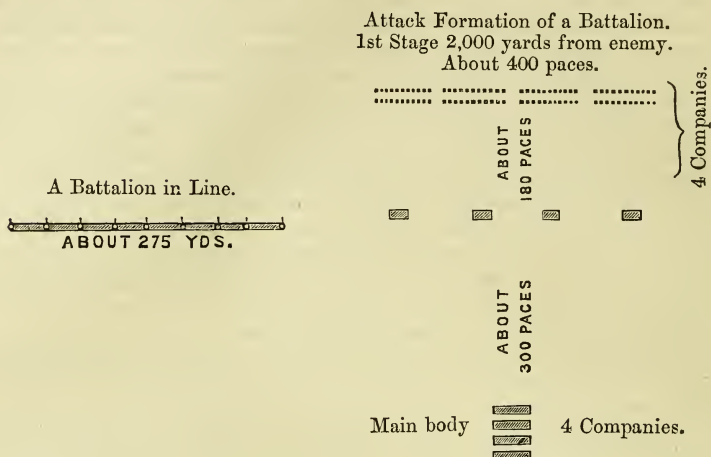
Novel Conditions in Wars of the Future which will render necessary a High Standard of Discipline.—The first of these conditions will be the withdrawal from the immediate control of a Commander-in-Chief of considerable portions of his army, and will be rendered necessary by the vast size of the forces which will probably be engaged. It is obvious, as previously stated, that where enormous armies are operating over a vast area, considerable freedom of action must devolve on subordinate Generals; and hence it will be most necessary that the latter should be loyal to their chief. This question, however, only affects immediately the higher ranks of an army, and its influence will probably be in some degree modified by the increased use of electricity as a means of communication; moreover, it is scarcely likely to make itself felt in an army of the size which this country will ever place in the field.

The second condition referred to has already become an important factor in war, and it may be anticipated that it will undergo further developments in the future. I allude to the loose formation in battle which has been forced upon infantry by the increased accuracy, range, and rapidity of fire of small-arms. This question is of vital moment to all ranks, and affects large as well as small armies.

Napoleon was of opinion that, "could there be two descriptions of infantry, one to act as skirmishers, and the other to remain in line, it would be necessary to choose the best disciplined men to act as skirmishers."¹ For the future, let it be remembered, all infantry will fight as skirmishers. The accompanying sketches represent—the first a battalion in the old shoulder-to-shoulder line, which was the fighting formation for infantry until eighteen years since,—the second a battalion in the extended order in which, henceforth, armies must advance to the attack.

¹ Montholon's "History of the Captivity of Napoleon."

It has been truly said that military problems are not susceptible of mathematical demonstration; but I venture to think that a glance



even at these sketches will show that, in the battles of the future, in consequence of the increased area over which a given body of men in fighting order will be extended, the direct control over their men which will be exercised by Commanders—battalion and company—must be greatly lessened. At the same time, the individual soldier will be relieved from the physical pressure of his comrades which compelled him, in the battles of the past, to act in concert with them and also imparted a feeling of confidence at critical moments.

The whole tendency, therefore, of the loose formation which has now become essential in battle is to militate against that unity of impulse and collective courage which it is the great object of discipline to establish. This tendency, antagonistic to all tactical success, can be counteracted by one agent alone—discipline, stricter, firmer, and better grounded than that of even the best organized armies of former days.

The long range of the rifles now in use, and the rapidity with which they can be loaded and discharged, have forced another problem on the attention of military reformers, namely, the question of “fire discipline.”

Fire Discipline.—Given an uneducated and untrained man, armed with a breech-loader, and his inevitable impulse, when in danger, will be to load and discharge his piece with the utmost rapidity, and without regard to direction, elevation, or any other consideration, except that of relieving his excitement by making the greatest possible noise. This impulse, the result of want of confidence, must give rise to fearful confusion: and whilst inflicting little loss on the enemy, leads to a consumption of ammunition which no system of supply can replace. Again, the only power which can control this element of disaster is discipline, so established as to lead each soldier to realize that his best

chance of safety and success is to destroy his enemy, that this can only be accomplished by availing himself, to the utmost, of the powers of his weapon, and that he can only avail himself of these by keeping cool and using his rifle in battle according to the rules which he has learnt in time of peace.

Conclusion.

Fifty years ago one of the most distinguished English Generals of this century thus expressed himself: "Discipline is necessary for health, for safety, for combinations, for keeping up numbers."¹ The causes which rendered discipline of vital importance when he thus wrote remain at the present day with unabated force; and, in addition, the improvements which have been effected in the implements of destruction have given birth to elements of war which can alone be controlled by a discipline more thorough than that which formerly prevailed, and more difficult to establish from the fact that it must be engrained in the heart and brain of each private soldier.

PART II.

I will now pass to the consideration of the means best suited for promoting and maintaining discipline in an armed force.

System of Discipline suited to a particular Army not always Effective with Soldiers of different Nationality.—This is an extremely complex question and opens up a very wide field for discussion, from the fact that the experience gained by studying any system, which has worked successfully in a particular army, cannot invariably be relied on as a guide to that which is suitable for soldiers of a different nationality.

The conditions which prevail both socially and politically, the peculiarities of national temperament, the object with which an army is maintained, and the system under which it is recruited, are all factors which must be carefully weighed before any reliable deduction can be drawn from the study of the military institutions of any particular nation.

This fact, sufficiently obvious in itself, is too often overlooked when comparisons are made between the armies of different States.

Mainsprings of Discipline in an Army.—Speaking generally, however, the following appear to be the mainsprings of discipline in any army, and on their perfection or otherwise will depend its efficiency :—

- (1.) The corps of Officers, their ability and zeal.
- (2.) The class of recruits obtained for the rank and file.
- (3.) The system of pay, messing, and clothing.
- (4.) The course of training.
- (5.) The non-commissioned officers.
- (6.) The system of advancement and reward.
- (7.) The code of punishment.

¹ General Sir Charles Napier.

- (8.) The work to be performed by soldiers in addition to the regular parades, and their occupations and amusements in camp or barracks.
- (9.) The system of training for the reserves.
- (10.) The efficiency of the various branches of the Staff.
- (11.) The organization.

1. *The Officers and their Qualifications. Social Position. Professional Ability, how Guaranteed.*

Experience points to the conclusion that for the maintenance of discipline, it is most desirable that the commissioned ranks of an army should be filled, to a great extent, by gentlemen of education occupying a good social position; but their qualifications should by no means rest here. The tests to be undergone before military rank can be attained should be sufficiently severe to guarantee that every Officer should be thoroughly competent, both theoretically and practically, to instruct those whom he may be called upon to command. "Subordination and habits of obedience are more necessary than mechanical discipline required at the drill; and these can be acquired by soldiers only in proportion as they have confidence in their Officers; and they cannot have confidence in Officers who have no knowledge of their profession."¹

Absolute ignorance can, to a great extent, be guarded against by applying severe professional tests in all cases before either a commission is granted or promotion is conferred; but careless indifference in the performance of duty is almost as prejudicial to discipline as absolute ignorance and is less easy to provide against. In a memorandum on discipline drawn up in 1829, the Duke of Wellington recorded his opinion that, "Our gentlemen Officer, however admirable his conduct on a field of battle, however honourable to himself, however glorious and advantageous to his country, is but a poor creature in disciplining his company in camp, quarters, or cantonments."²

Lack of Zeal, how guarded against.—Such lack of zeal as that indicated can alone be prevented by the existence of a conviction on the part of each Officer that his professional success will depend on his own merits alone. Nothing is more calculated to deaden zeal, and lead to a perfunctory discharge of duty, than a belief amongst the members of any profession that their advancement is purely a matter of favour or chance.

At the same time it is most undesirable that the attention of Officers should be distracted from their duty, by uncertainty as to the duration of their tenure of office, or as to the rates of pension to which they will be entitled on retirement; and hence it is essential, in the interests of discipline, that the regulations affecting the conditions under which Officers serve should be the subject of change as rarely as possible.

¹ "Wellington Despatches," by Gurwood.

² "Wellington Despatches."

Before leaving this branch of the subject, it may be observed that the complications which science has introduced into the art of war render it necessary that Officers should have a professional education as thorough and as profound as that which is usually possessed by members of one of the learned professions.

2. *Class of Recruits obtained for Rank and File.*

The system under which recruits are obtained will principally determine the standard of intelligence and education of the rank and file of an army, and will thus obviously exert considerable influence on its discipline. No surer guarantee of discipline can exist than that which is provided by the self-respect and patriotism of educated men, whatever may be said to the contrary.

“National institutions only will produce that moral discipline necessary to make a soldier fulfil his whole duty; yet the late Lord Melville was not ashamed to declare in Parliament that the worst men made the best soldiers, and this odious, narrow-minded, unworthy maxim had its admirers.”¹ The justice of Sir William Napier’s criticism was well exemplified years after he wrote these words. The soldiers composing the German Armies in 1870 were better educated and more intelligent than those of any force that has ever taken the field, and nothing could have been more perfect than the discipline which they uniformly exhibited.

Result of Compulsory Service.—If an army is recruited, as the German Army is, by strict compulsory and universal service, its ranks will be filled with individuals from every class of the community; and the large percentage which must necessarily exist of well or fairly educated men will exercise a restraining influence on the whole body. If, on the contrary, an army is recruited under a purely voluntary system, it must compete against other callings in the labour market; and the inducements which any Government will hold out to recruits are usually too insignificant to induce any, as a rule, but men from the least intelligent and worst educated classes to enlist. Under such circumstances, the best and indeed the only course is to try to educate the soldier after he joins the Service, and, as far as may be, to combine civil education with military training.

3. *System of Pay, Messing, and Clothing.*

The pay which a soldier receives, the amount of food which is given him, and the clothes with which he is expected to adorn his person are details which have an important influence on discipline.

“The young soldier is naturally suspicious and always disposed to believe that his immediate superiors impose upon his ignorance.”² The disposition of soldiers has not changed since Napoleon thus delivered himself; moreover, at the present day, the vast majority of soldiers are very young.

¹ “History of War in the Peninsula.”

² “History of the Captivity of Napoleon.”

Desirable that Regulations as to Pay and Rations should be clearly understood.—It is, therefore, most desirable that the regulations which govern the issue of pay and rations should be so framed as to be perfectly understood by all. Nothing more surely produces discontent, and hence injuriously affects discipline, than for men to enlist under the impression that they will receive a certain rate of pay; and for recruits to discover, after joining, that the anticipated wage is subject, before it reaches them, to numerous and varying deductions.

English soldiers, for example, nominally receive, in return for their services, free rations and the sum of 1s. a day; besides being clothed by the State. The free ration, however, includes but a bare allowance of bread and meat; and the coffee even with which the soldier washes down his morning and evening meals, and the vegetables which give relish to his stew, are paid for by withholding a portion of his pay. His remuneration is thus reduced much below its nominal amount, and the young soldier considers himself aggrieved accordingly.

Injury which the Lack of sufficient Food inflicts on Discipline.—The most serious injury, however, which the lack of sufficient food inflicts on discipline is the increase of drunkenness to which it inevitably gives rise. In our Army a soldier has nothing to sustain him between his dinner at midday and his breakfast at eight o'clock next morning, except a meagre and uninviting repast of dry bread and weak coffee, for which many men do not trouble to stay in barracks. The result is that anything that a soldier may imbibe, in the course of an evening, of an alcoholic nature acts on his brain like fire. It has again and again been urged that nine-tenths of the crime in the British Army arises from drunkenness; but I believe that ninety-nine out of every hundred cases of drunkenness amongst soldiers are attributable to their prolonged and daily fast from midday to morning.

Influence on Discipline of Uniform.—As regards the influence on discipline of uniform, the present Adjutant-General has stated that "the better you dress a soldier, the more highly he will be thought of by women, and consequently by himself."¹ At the same time it would appear to be undesirable that the keeping up of a good appearance should be a drag on the soldier's slender means. In our Service, young soldiers are often obliged to pay for new clothing to replace that worn out on duty, hence discontent, and consequent injury to discipline. To avoid this, and enable the men to present the smart appearance which is conducive to discipline, it would certainly appear to be desirable that soldiers should have two distinct uniforms: one to be neat and effective, and to take the place of the present full dress, but to be always worn when walking about off duty, and also on all State parades; the second uniform to be of a strong, serviceable material, and to be of a dark or cardinal red, so as not to readily show wear and tear, and to be used for all ordinary parades. The authorities have of late years issued a blue undress to recruits, but this not being of the national colour, cannot generally be worn. In any case, however, it would seem to be best in the interests of discipline that

¹ "The Soldier's Pocket-book."

the uniform provided should be sufficient for the requirements of all but very dirty or very careless men.

In conclusion, I venture to think that the discipline of our Army would gain, whilst its cost would be very little increased, if the men were provided with an ample sufficiency of both food and clothing, and their pay lowered to one half its present nominal amount, but this sum to be liable to no stoppages for clothing or messing, and, in fact, to be irreducible except for misconduct.

4. *The Course of Training.*

The youth of the non-commissioned officers of the present day renders it desirable that considerable supervision over the training of the men should be exercised by the company Officers. Nothing strengthens the bonds of discipline more than any custom which habituates the men to look to their Officers for guidance and instruction under all circumstances of difficulty, and an excellent system has of late years been adopted in our Service of placing each squadron and company under its own Officers for a month annually, during which time a special course of training in reconnoitring, outpost duty, &c., is gone through.

Advantage to Discipline from Officers instructing their Men.—"There is no better lesson in command," says Sir Charles Napier, "than to let Captains teach their Officers and privates. It imposes responsibility, obliges them to reflect on their duties, and gives a facility for explaining themselves to others; for this reason I always like to see Officers attached to the same company as far as practicable."¹

The system of making Captains responsible for the training of their men, therefore, strengthens the bonds of discipline in two ways: directly by increasing the hold which the Officers have on the rank and file, and indirectly by accustoming the company Officers to exercise command.

Training of Recruits.—Considerable discussion has from time to time taken place as to the advisability of the instruction of recruits being carried on by Officers, instead of by the non-commissioned officers. This point is of some importance as affecting the promotion of discipline, and should, therefore, not be passed without notice in this essay. No doubt, in the German Army the system of placing recruits under the immediate supervision of the company Officers has worked well, but it must be remembered that the task of training is, to use the words of a recent article in the R.U.S.I. Journal, "materially assisted by the military training which all young Germans receive while at school, as well as by the high standard of education diffused throughout the nation. The Lieutenant-Instructor of the company has not to waste his time on hopelessly ignorant dullards, but can count on every recruit with whom he has to deal having a good elementary education, and thus being able to benefit by the teaching which is to fit him for his duties as a soldier."²

¹ "Life of Sir Charles Napier," by Sir W. Napier.

² "R.U.S.I. Journal," No. 133, p. 313.

The task of breaking in the rough element to be found amongst English recruits is a more difficult matter, and, if undertaken by the commissioned ranks, would probably, by bringing the Officers directly into collision with the men, be by no means productive of discipline.

Influence of Drill on Discipline.—As regards the question of drill, all authorities appear to be of opinion that a certain amount of steady drill, in close order, is essential to the promotion of discipline, but at the same time, as such formations cannot now be employed under fire, it would apparently be desirable, with a view to saving time, that all manœuvres in close order should be rendered as simple and easy as possible.

Fire Discipline.—Before leaving this part of the subject it will be well to allude to the question of “fire discipline,” and the best means of maintaining discipline generally, amongst soldiers when in extended order.

In a paper entitled “A German Opinion on the Delhi Manœuvres,” recently published in the R.U.S.I. Journal, it was stated that, in the English Army, “when the attack commences, all the outward forms of discipline are abandoned.” Without hazarding any opinion on this point, it may still be remarked that, on the command being given on an ordinary parade for a battalion to extend for attack, many excellent Officers, at other times quiet and self-possessed, become seized with a species of frenzy, which leads them to pour forth orders and counter-orders, to the confusion of themselves and everyone else. One company is found fault with for not, perhaps, trailing arms correctly, another for not dressing, when extended, with perfect precision; and it is not uncommon to see portions of the firing line ordered to close and extend over again, because of some lack of smartness or mathematical regularity in their extension. The result of this is that all ranks become thoroughly bothered and confused, and discipline is relaxed at the very moment when it is most required, both for the control of fire and for the maintenance of order.

Without doubt, precision and attention to detail are of importance in all military manœuvres; still, considering the great amount of time which soldiers spend in drilling in close order in a barrack square, with the express object of attaining smartness and precision in dressing and such matters, it would appear to be desirable, on the somewhat rare occasions on which infantry assumes a fighting formation, for the Officers to strain every nerve in mastering the intricacies of the work in hand, and in disciplining the men to aim carefully and avail themselves of advantages of ground, whilst preserving their unity of action. To recapitulate this branch of the subject, it may be said that in the interests of discipline, recruits should on joining be grounded in their drill, and trained to habits of order, cleanliness, and propriety by non-commissioned officers, under the supervision of an Adjutant; that, having been initiated in these mysteries, recruits should receive instruction in more scientific matters, such as outpost duty and musketry, from their company Officers; and lastly, that whilst due attention should be paid to steady drill, on the one hand, on the other, every

effort should be made both to habituate the soldier to extended formations, and to establish that kind of discipline which may lead a man, when free from control, to keep cool and make the best use of his rifle.

5. *Non-commissioned Officers.*

In one of his letters, the Duke of Wellington stated that "the foundation of every system of discipline which has for its object the prevention of crimes must be the non-commissioned officers of the Army."¹ Great difficulty is experienced in the English Army at the present day in obtaining thoroughly reliable non-commissioned officers; and apparently in the armies of most Continental nations a similar difficulty is making itself apparent.

Their Influence on Discipline.—It must be remembered that the duties of the non-commissioned ranks are by no means easy to fulfil. They should form a connecting link between the Officers and privates; they should act as advisers as well as instructors to the young soldiers, and their constant presence amongst the latter should enable them to prevent many irregularities which, if permitted to go on unchecked, would lead to serious breaches of discipline.

It is obvious that considerable experience and technical knowledge, coupled with tact and self-restraint, are most necessary amongst the higher non-commissioned ranks, if these duties are to be successfully performed.

It should also be borne in mind that the extended fighting formations of the present day must necessarily give greater independence to each non-commissioned officer on the field of battle, and hence, as considerable individual responsibility in enforcing fire discipline must result, it is most desirable that the training of non-commissioned officers should be sufficient to fit them for exercising control over men under circumstances of difficulty and danger.

Difficulty in a short Service Army of filling non-commissioned Ranks.—In a short service army, the ranks are filled with very young soldiers, amongst whom the qualities necessary for good non-commissioned officers are not usually developed, and hence great difficulty must arise in selecting men for promotion. This difficulty can only be met by holding out considerable inducements to soldiers to qualify themselves by study and hard work for advancement.

With this object, not only should the immediate gain of higher pay and position be offered, but also it would appear to be desirable that the prospective advantage should be presented to any man qualifying for and receiving the rank even of corporal, of being permitted to remain in his regiment during good behaviour and efficiency, with the certainty of pension when his military career is at an end. Some of the smaller appointments in the Civil Service might also be reserved for non-commissioned officers who have retired after long and faithful service.

¹ "Wellington Despatches."

6. *System of Advancement and Reward.*

The question of advancement and reward has been alluded to with reference to both Officers and non-commissioned officers, but I will now consider the subject in greater detail.

The profound discontent which pervaded all ranks of the French Army, and which was excited by the barriers which existed to individual ambition, was one of the principal causes of that complete disappearance of discipline at the time of the Revolution, to which allusion has already been made.

Causes of Indiscipline in French Army at the Time of the Revolution.—The French nobility had, up to that period, monopolized commissions in the army, and the grade which an Officer held depended entirely on his social position, without reference to individual merit or length of service. These monopolies of military rank are described as being “burthensome to the State and odious to the people, without being in the same degree beneficial to those who enjoyed them. Even in military service, which was considered their birthright, the nobility of the second class were seldom permitted to rise above a certain limited rank. Long service might exalt one of them to the grade of Lieutenant-Colonel, . . . but all the better rewards of a life spent in the Army were reserved for the nobles of the highest order.”¹ These restrictions gave rise either to listless apathy or to bitter but concealed resentment—sentiments entirely subversive of all discipline.

Reasons assigned by Duke of Wellington for Indiscipline of English Army in Peninsula.—Eighteen years later, during the Peninsular War, the Duke of Wellington frequently alluded in his despatches to breaches of discipline, which he attributes to lack of zeal of subordinate Officers. The inherent fighting power of the British soldier, the failure of Napoleon’s ambitious schemes in other lands, and last, but not least, the splendid genius of the Duke of Wellington, combined to crown our efforts in the Peninsula with success; but there is the authority of the Duke himself that the difficulties of the undertaking were immeasurably augmented by indiscipline, caused by neglect of duty on the part of the regimental Officers, such neglect being the result of his inability to hold out any hope of reward to those serving under him. Thus, on the 17th June, 1809, the Duke wrote: “We all know that the discipline and regularity of all armies must depend upon the diligence of the regimental Officers, particularly the subalterns. . . . There are two incitements to men of this description to do their duty as they ought—the fear of punishment and the hope of reward. As for the first, it cannot be given individually, for I believe I should find it very difficult to convict any Officer of doing this description of duty with negligence. . . . As for the other incitement to Officers to do their duty zealously, there is no such thing. We who command the armies of this country, and who are expected to make exertions greater than those made by the French,

¹ Scott’s “Life of Napoleon.”

... have not the power of rewarding or promising a reward for a single Officer of the Army."¹

Again, on the 7th June, 1810, the Duke drew attention "to the state of discipline of the army in general, which I have stated to be attributable in some degree to the want of the power to reward in the hands of those who are honoured with the charge of commanding His Majesty's troops on foreign and active service."¹

A distinguished historian of this campaign thus alludes to the same subject. "Napoleon's troops fought in bright fields, where every helmet caught some beams of glory, but the British soldier conquered under the cold shade of the aristocracy. No honours awaited his daring, no despatch gave his name to the applause of his countrymen, his life of danger and hardship was uncheered by hope, his death unnoticed."²

Necessity of a well-considered System of Advancement and Reward.—All experience points to the conclusion that the existence of a well-considered system of advancement and reward, applicable to all ranks, is one of the surest guarantees of discipline; and whilst, on the one hand, distinguished valour and ability in the field should meet with prompt recognition, on the other, marked zeal and efficiency, even in time of peace, should not be allowed to pass altogether unnoticed.

7. Code of Punishment.

The consideration of rewards naturally leads to the subject of punishments, and it may here be observed that a code of penalties of excessive severity is by no means such a support to discipline as might at first sight be imagined.

Towards the termination of the last and at the beginning of the present century, the British Army served under a scale of punishments of ferocious brutality. Soldiers were frequently scourged until their bladebones were "laid bare and white as those of a skeleton":³ a sentence of 900 lashes was considered a medium infliction; and an Officer who had hesitated, from motives of humanity, to inflict such a punishment would have met with little sympathy. The physical sufferings of the wretched victims were in most cases augmented by mental torture; and after the infliction of innumerable lashes the unhappy soldier was placed on low diet, and a confession was wrung from him by threats of further scourgings on his half-healed back.

Yet what was the result of this system?

Evil Results to Discipline from Excessive Severity.—Sir Ralph Abercromby described the English soldiers of the latter portion of the eighteenth century as formidable to everybody but the enemy: and it is probable that the discipline of the British Army never stood lower than it did at that epoch.

So great was the detestation for their profession which prevailed

¹ "Wellington Despatches."

² "History of War in the Peninsula."

³ "Life of Sir Charles Napier," by Sir W. Napier.

amongst the rank and file, that the men "sought by a variety of devices, evincing extraordinary resolution and subtlety, to escape from their unhappiness. Amongst other modes they created a bastard ophthalmia, which ruined many hundreds of the finest men, and for a long time baffled the medical Officers, both as to cause and cure. Finally, it was discovered that a soldier of the 28th was the originator; and that he had taught the patient to hold his eyelids open, while a comrade scraped lime from the barrack ceiling into his eyes. Inflammation was kept up by other means, the disease became contagious, and the result was terrible; thousands of the finest men were lost to the service."¹

Again, in 1870-71, it is said that a bullet was kept in store for every unruly French soldier, and that military executions were common on the side of the French; but their discipline was, as we have seen, radically defective. The code of the German Army, on the contrary, was remarkably mild, and the number of punishments inflicted was comparatively few. Although, however, a brutal and degrading system of punishment is opposed to discipline in its highest form, yet a concurrence of men cannot be controlled unless some sharp remedies are held in reserve to force habits of discipline on the unruly. The higher the standard of education of the rank and file, the less severe will these correctives require to be.

Effect of Hardships on Discipline of Troops.—Again, the severer the hardships and trials to which troops are exposed, the greater will be their tendency to break away from discipline, and harsher must be the penalties necessary to restrain them. At the same time punishment, to be effective, should be swift and sure; and, therefore, military law should, as far as possible, be free from legal technicalities; and should be worked on lines intelligible to all.

In commenting on the practice of making fine-drawn distinctions and laying stress on trifling discrepancies of evidence given before courts-martial, Sir Charles Napier remarks: "To put the pipe down! To take the pipe out of his mouth. To extinguish the pipe—were all one. To make all these distinctions which have no difference is to mislead Officers, and shake their confidence in their own powers, as forming a military court. Such impediments to justice lead to the destruction of all military discipline."¹

8. *The Work to be performed by Soldiers in addition to the regular Parades: and their Occupations and Amusements.*

The principal duties which a soldier has to perform, besides his regular parades, are guards, fatigues, and orderly duty.

Guards.—With reference to the first of these, a certain number of guards are essential, either for actual protection or for purposes of instruction; but as such duty is oppressive, if frequently performed, especially to young soldiers, it is very desirable that the number of guards should be reduced to a minimum.

¹ "Life of Sir Charles Napier," by Sir W. Napier.

Sir Charles Napier thus describes the effects, on the force under his command in India, resulting from an excessive amount of guard duty. "Discipline becomes slack, Officers on detachment are idle, soldiers insolent and disobedient, guards do their duty slovenly, or not at all, and the whole becomes weak and worthless."¹

Fatigues.—As regards the second of the above-mentioned duties, a certain number of regimental and garrison fatigues, such as cleaning barracks and so forth, must be performed by the troops; but at the same time, the less men are occupied in menial duties, especially in cases where they can be seen by the general public, the better for their self-respect and hence for their discipline. It may be said that the class of men who usually enlist in an army, recruited under a voluntary system, are accustomed to labour, and ought not to object to performing it; but it must be remembered that such men join the military profession with a view to becoming soldiers, not labourers. A civilian also can perform any drudgery without exciting notice, whereas a soldier is always conspicuous, and if similarly employed, is likely to be made an object of remark or ridicule, calculated to wound his self-respect, and cause him to dislike his profession. These may appear to be small matters, but soldiers' lives are made up of trifles.

Orderly Duty.—A large number of soldiers are at all times employed in acting as orderlies. This duty is not instructive, like going on guard, and is not required, like fatigues, for purposes of cleanliness or health; and as men thus employed are usually withdrawn from all parades and instruction, it is most desirable that the number of orderlies, both garrison and regimental, should be limited as strictly as possible.

Bad Effects on Discipline produced by withdrawing Soldiers from their regular Instruction.—It should be borne in mind, with regard to both fatigues and orderly duty, that as frequent instruction of soldiers by their Officers tends to draw tighter the bonds of discipline, so, on the other hand, their constant withdrawal from such instruction must have a directly contrary effect: and further, that if young soldiers are left to their own devices to any extent, as they must be when acting as labourers or messengers, they are apt to become careless, and to lose those habits of order, punctuality, and cleanliness which lie at the root of discipline.

Occupations and Amusements.—A soldier's occupations and amusements in barracks are important factors in the maintenance of discipline.

As the attractions of taverns and other haunts of a garrison town are the sources from which a soldier's troubles usually spring, every effort should be made to occupy the men's spare time profitably, or at any rate innocently, and to induce them to look on their barracks as their home: hence reading and recreation rooms should be developed, and any reasonable amusements should be encouraged to the utmost.

¹ "Life of Sir Charles Napier."

9. *Training of the Reserves.*

Necessary that Men should be periodically recalled to the Colours.—Soldiers on quitting the colours quickly lose their military spirit and discipline, and, therefore, if the regiments and corps composing an army are dependent on the reserves for the completion of their war establishments, it is very desirable that the reserve men should be periodically embodied for training in times of peace, so that when they are recalled to the colours on the outbreak of war, the discipline of the various units may not suffer from the influx of a large number of men whose military instincts have been allowed to rust for years in civil life.

The reserves of the German Army had, previous to 1870, been subjected to trainings at regular intervals, and hence its discipline was unimpaired by the great augmentation which took place, on the declaration of war, by the recall of the reservists to the colours.

On the calling out of the French reservists, who had not been subjected to periodical trainings with the same regularity, serious riots and excesses occurred; and at Strasburg and elsewhere, crowds of reserve men who had not been told off to any particular regiments wandered about the streets, and added to the general confusion by begging and creating disturbances. Again, on the calling out of our own reserves in 1878 and in 1882, most of the men had not performed any military duty since quitting their regiments on the expiration of their service with the colours; and in many instances the reservists appeared at first to have, to some extent, lost their military instincts, and to have found a difficulty in settling down to the steady routine of military discipline.

Desirable that the Reservists should rejoin the Regiments in which they originally served.—It is also advantageous, in the interests of discipline, that reserve men should, when recalled to the colours, rejoin the same units in which they originally served their apprenticeship as soldiers. Men will usually be under greater restraint, and will yield a more cheerful obedience, when serving under Officers and non-commissioned officers whom they know and to whom they are known, rather than if they were under strangers; and, moreover, human beings are creatures of habit, and hence, if a man finds himself amongst familiar faces and surroundings, he will generally settle down quickly and easily into the habits of order and regularity to which he has been accustomed in former years, and under similar circumstances.

10. *Efficiency of the Staff.*

Any detailed description of the functions of the Staff would be out of place in this essay; nor will it be possible to distinguish nicely between the duties of its various branches; but it is only necessary to consider for a moment the nature of these functions to fully realize the disastrous results to discipline which must arise from any lack of efficiency in this part of an army, especially during a campaign.

Duties of the Staff considered.—Staff Officers, besides adopting regulations for good order and police, must arrange all details necessary for the assembling of troops, the execution of marches, the formation of camps, and the supply of information. They are responsible for the organization of the lines of communication, and hence must supervise the passage to and from an army of the convoys on which it depends, on one hand for the supply of provisions and munitions of war, on the other for the withdrawal of the sick and wounded. In a word, on the Staff of an army devolves the duty, not only of supervising and directing, from its inception to its completion, every manœuvre the execution of which is required by the plans or necessities of a Commander-in-Chief, but also of carrying out the preliminaries without which no movement could be attempted with any hope of success.

Disastrous Result to Discipline from Inefficiency of Staff.—Want of forethought, or neglect, or even slackness in the performance of any detail, will inevitably give rise to friction, calculated to strain the discipline of the military machine, perhaps beyond its utmost endurance.

We learn from Sir William Napier that during a part of the Peninsular War “a notable thing was the discontent of the veteran troops with the Staff Officers. The assembling of the sick men at the place and time prescribed to form the convoys was punctually attended to by the regimental Officers; not so by the others, nor by the Commissaries who had charge to provide the means of transport, hence delay and great suffering to the sick, and the wearing out of healthy men’s strength by waiting, with their knapsacks on, for the negligent. When the Light Division was left on the right bank of the Tormes to cover the passage at Alba, a prudent order that all baggage or other impediments should pass rapidly over the narrow bridge at that place without halting on the enemy’s side was . . . so rigorously interpreted as to deprive the troops of their ration bullocks and flour mules at the very moment of distribution. . . . All regimental Officers know that discontent thus created is most hurtful to discipline, and it is in these particulars the value of a good and experienced Staff is found.”¹

Qualifications necessary for Staff Officers.—The duties of the Staff being therefore both varied and difficult, it is essential to the proper discipline of an army that the Officers composing its Staff should not only have educational attainments and industry, but should, in addition, be practical men, possessed of judgment, character, and resource, and hence the greatest care should be exercised in their selection.

11. Organization.

As regards organization, there appears to be no doubt that the system of localizing regiments and corps, and forming them into permanent brigades and divisions, is that which is best calculated to maintain the discipline of an army.

¹ “History of War in the Peninsula.”

Advantages of Localization.—Such a system, however, can rarely be completely carried out, or applied without exception to the units of an army. Political considerations, as in France, may render it impossible, or at all events most undesirable, to quarter regiments in the towns or districts from which they are recruited ; or the possession of a Colonial Empire, as with England, may render it necessary to withdraw considerable portions of the army from the mother country, and to maintain these portions in distant quarters of the globe, as garrisons for remote dependencies. Such detachments militate against discipline, because they prevent the organization of the regiments and corps into brigades, divisions, and army corps, and at the same time necessitate the frequent transfer of soldiers from one part of the Empire to another.

Memorandum by the Duke of Wellington.—In a memorandum on discipline, drawn up in 1829, the Duke of Wellington thus refers to this subject : “ We must observe that the army of Prussia, besides the advantage of its state of ordinary repose, to enable it to carry into execution this system of discipline, is at all times regularly organized, each battalion in its regiment, each regiment in its brigade, each brigade in its division, each division in its *corps d’armée*; the whole under the personal inspection of the King. So that there is not a corps, division, brigade, regiment, battalion, company, or individual whose conduct is not checked and controlled by his superior, as well as by the view and knowledge of the whole of the profession. Compare this state of things with the British Army—with our detachments in Ireland and the West Indies, Honduras, &c., with our total want of inspection and control over either Officers or men, in nearly all parts of the world, and we shall see cause for astonishment that there is any discipline in the Army at all.”¹

Conclusion.

A French writer of the eighteenth century has defined discipline to be “the art of inspiring soldiers with more fear of their own Officers than they have for the enemy;” an epigrammatic utterance which, like many other sayings of a similar character, is far better known and oftener quoted than it deserves to be.

The chances of success which would, in the present day, attach to any army whose discipline was maintained by fear alone, would, other things being equal, be small indeed if pitted against a force disciplined on more enlightened principles.

The whole fabric of discipline in a military body should have, as its foundation, intelligent habits of order and regularity, instilled in time of peace by careful and systematic training. It is by no means implied that discipline can be upheld without resort to punishment, for in any body of men individuals will be found for whose guidance in the paths of military virtue something more tangible than moral

¹ “Wellington Despatches.”

² Helvetius’s “L’Esprit.”

suasion will be requisite; but at the same time the code of punishments should exist rather as a reserve, to be called forth on emergency, than as a prominent factor in the maintenance of discipline.

In the interests of discipline, the entire system of training—the whole routine of military life—should have for its object, in addition to actual instruction, the establishing of an interest in, and liking for, his profession, on the part of each soldier; and this can best be accomplished by making the work as attractive as possible. It is recorded that, at the beginning of the present century, soldiers were “maddened by the monotony of drill,”¹ and discipline suffered in consequence; but the numerous subjects in which soldiers must now be instructed should render such monotony impossible in the present day; and outpost duty, reconnaissance, elementary field engineering, and musketry can be made to form a welcome variation from the monotony of regular drill in the barrack square.

“The greater the individuality you give to the soldier himself and to his battalion, the more he feels that his individual conduct is of importance. . . . Make a man proud of himself and of his corps, and he can always be depended upon.”²

In recent years, the tendency of the military authorities in this country has been to ameliorate the condition of the rank and file, and, by judicious concessions of increased freedom, to give rise to sentiments of self-respect and individual responsibility. No evil results to discipline appear to have arisen from these reforms; on the contrary, the conduct of both non-commissioned officers and men seems to improve year by year, clearly proving that the concessions granted have been strides in the path of discipline in its highest and best form; and that whilst, on the one hand, individual freedom is consistent with a disciplined devotion to duty, on the other hand, an oppressive military system is in no sense a guarantee of discipline or of efficiency.

“Jove fixed it certain that whatever day
Makes man a slave, takes half his work away.”

¹ “Life of Sir Charles Napier.”

² Lord Wolseley: “Soldier’s Pocket-book.”

ESSAY.

“DISCIPLINE: ITS IMPORTANCE TO AN ARMED FORCE, AND THE BEST MEANS OF PROMOTING AND MAIN- TAINING IT.”

By Captain F. G. STONE, R.A.

Motto: “Suaviter in modo, fortiter in re.”

ARRANGEMENT OF THE SUBJECT.

Introduction.—Nature of Discipline: its signification, its threefold aspect.

Mental and Moral Aspect of Discipline.—Analysis of its nature. Cultivation of individuality and sense of responsibility. Intelligent *v.* blind obedience. Officers to study their profession. Encouragement to study. Training of cadets. Importance of minor duties. Selection of Officers to train youth. Spartan discipline. Effect of moral force. Difference between technical and moral discipline illustrated by War of American Revolution. Ethnological considerations. Spartan Army. German Army. British Army. Influence of the commander. Napoleon, Blücher, Wellington. Selection of Commanders. Officers sharing hardships with their men. Increasing importance of intellectual training. Conscription. Recruiting. Good class of Officers easily obtained, but this not the case with rank and file. Political considerations. Social considerations. Responsibility. Obedience. Organization: the artillery “division” and the infantry “section.” Soldiers’ food. System of contracts. Supply of food to an army in the field. Military music. Recreation.

Physical and Technical Aspect of Discipline.—Training of instinct by habit. Control by training, and not by word of command. New attack formation for infantry. Length of bayonet. Night operations. System of casualties. Troop and company training. Use of arms. Marching in peace and in war, strategic marches, standing under arms, reconnoitring and screening duties, carrying men’s packs. Individual training. Guards and sentries. Fatigues.

Penal Aspect of Discipline: Military Law.—The power of law. Different aspects of the same crime. Difference between social and military law. Administration of military law in peace-time. Discretion of Commanding Officer. Responsibility of sections and companies for their own discipline. Power of company Officers and non-commissioned officers to inflict minor punishments. “Marching order.” Preventive measures. Duties of Adjutant. Statistics of crime. Defaulter sheets. Crime on service. Custom of war. Wellington and Napoleon. Flogging. Death. Summary punishment by field imprisonment. Discharge with ignominy. Statistics of punishments. Minor offences on service, their prevention. Rewards.

Summary.—Selection of recruits. Influence of short service. Modified system advocated. Mobilization. Subaltern Officers. Duties of the State and influence of public opinion.

Appendix.—Rates of pay and pension: stoppages, rewards, &c., from 1848 to 1888.

WORKS referred to and Abbreviations used.

TITLE OF WORK.	ABBREVIATION.
"A Sketch of War as it will be." Translated from the German "Das Volk in Waffen" of General von der Goltz, by Sir Lumley Graham, Bart., R.U.S.I.....	<i>Goltz.</i>
"Annals of Tacitus".....	<i>Tacitus.</i>
"Annual Return of Courts-Martial and Minor Punishments;" known as General FitzWygram's Return	<i>FitzWygram.</i>
"Armies of Asia and Europe." General Upton's official report to the United States' Government	<i>Upton.</i>
"Army Act," 1881.	
"Army Discipline and Regulation Act," 1879.	
"Callwell's Prize Essay." Gold Medal R.U.S.I.....	<i>Callwell.</i>
"Courage." By Lord Wolseley. "Fortnightly Review," August, 1888	<i>Wolseley on Courage.</i>
"Descent of Man." Darwin	<i>Darwin.</i>
"Extracts from Divisional Orders." By Lieut.-General Sir F. Roberts	<i>Roberts.</i>
"Fire Tactics for Infantry." Captain Mayne, R.E.	<i>Mayne.</i>
"Formation, Discipline, and Economy of Armies." Jackson	<i>Jackson.</i>
"General Orders."	<i>G. O.</i>
"General Annual Return of the British Army, 1880-81".....	<i>Gen. Ann. Return.</i>
"Haydn's Dictionary of Dates".....	<i>Haydn.</i>
"Letters from General Sir Robert Wilson, British Commissioner with the Russian Army, 1812"	<i>Sir R. Wilson.</i>
"Library Dictionary of the English Language."	
"Mechanism of the Counter Attack." By Major Smith, R.A., R.U.S.I.....	<i>R.U.S.I.</i>
"Military Genius." By Lord Wolseley. "Fortnightly Review," August, 1888	<i>Wolseley on Mil. Genius.</i>
"Military Law." By Major-General C. J. Napier, C.B.....	<i>Napier.</i>
"Pay Warrants."	
"Queen's Regulations."	
"Report on Magazine Rifles".....	<i>Colonel Slade.</i>
"Report of Committee to enquire into the Conditions of Soldiers' Service as affected by the Short Service System"	<i>Report on Short Service.</i>
"Report of the Director-General of the Army Medical Staff, 1886."	<i>Director-General A.M.S.</i>
"Royal Commission on Recruiting, 1861 and 1867."	
"Sir A. Alison's Memorandum to the Troops at Aldershot, September, 1888"	<i>Sir A. Alison's Mem.</i>
"Tovey's 'Laws and Customs of War'".....	<i>Tovey.</i>

Nature of Discipline.—Discipline is an exotic, planted often in ungenial soil, requiring unremitting care in its cultivation, and bringing its fruit to perfection only when tended by a skilled and sympathetic hand. In peace-time it underlies and forms the basis of the entire military fabric; and in war it is the invisible essence which, permeating an entire army, inspires it with the soul of the Commander, and enables it to achieve great and glorious deeds.

The primary signification of the word is—"education; training of the mind; formation of manners:" its secondary meaning is—"subjection to authority; accustoming to regular and systematic action;

drill:" and its final implication is—"penal infliction; improvement by corrective and penal methods."¹

We may thus approach the subject from three points of view, and treat it under (1) its mental and moral aspects; (2) its physical and technical aspects; and (3) its penal aspect: these three avenues of approach being, however, coexistent, and converging always on the same point, while side lights from one will ever and anon flicker across our path in pursuing another.

Mental and Moral Aspects of Discipline.

"The superiority which disciplined soldiers have over undisciplined hordes is principally a consequence of the confidence which each man places in his comrade."²

"Mutual, and not independent action, is the secret of success in war, and for mutual action to exist there must be discipline, direction, and control."³

The importance of this mutual confidence can scarcely be over-rated, and should be fostered by every means in our power. The reluctance shown by many military experts, before they could be brought to acquiesce in the comparatively loose fighting formation of the present day, was founded on a not unreasonable apprehension, that the feeling of confidence engendered by the proximity of comrades on the right and left, and also in rear, to say nothing of the perfect control of every section, company, and battalion by its own Commander, would be seriously impaired if not altogether lost. It is, however, necessary to accommodate ourselves to altered circumstances, and while fully recognizing the difficulty, seek for the best means of overcoming it. It would be futile to rely any longer upon the rigid discipline of close formations under which Wellington found it possible to achieve his memorable victories: the soldier was then always under the eye of his Officer, and whether standing on the defensive or advancing to the attack, whatever his individual feelings might be, he was from force of circumstances unable to indulge them, unless they happened to be in consonance with those of his Commander. His comrades on either side of him appeared to be carrying out their duty without flinching, and he did not stop to enquire the cause, but buoyed up by the moral support thus unconsciously rendered, assumed a confidence which, had he been able to read the thoughts of his comrades, he might have been far from feeling.

This mutual confidence is still a factor in the question, but we have perforce to work now upon different lines in order to cope successfully with the new order of things which has arisen under the *régime* of modern firearms and extended formations. The tendency of the old system of military training was to convert a man into the most

¹ "Library Dictionary of the English Language."

² Darwin's "Descent of Man."

³ Mayne's "Infantry Fire Tactics," p. 418.

perfect automaton possible; a soldier had "no business to think," he was required only "to do as he was ordered." Our present system is by no means free from reproach in this respect; but our aim in the future must be to cultivate the individuality of the soldier, so that he may not find himself at a loss when left to his own resources; to rouse in him a sense of responsibility, and thus raise his self-respect; to cultivate his moral tone, so that he may understand the value of obedience to orders, and carry them out from a high sense of duty, and not from fear of punishment. Again, we must cultivate his intellectual faculties in order that we may be able to appeal to his reason, for it cannot be doubted that an order is better carried out by a man who understands its purport than by one who merely obeys blindly because he is trained to do as he is told without question. This is especially necessary with young soldiers, who, from lack of experience and matured judgment, require the object for which they are striving to be kept prominently in view: a young soldier is, moreover, naturally eager and impulsive, and a good Commander should know how to turn these qualities to account.

It is not to be supposed that any questioning of the *necessity* of an order should be permitted for a moment, but there is no doubt that a man who is accustomed to understand that there is always a reason for every order given, will readily realize that he must carry out many orders for which the reasons may not be evident to him until long after they have been executed, and perhaps not even then: not only will such a man carry out orders promptly, but he will also carry them out intelligently; and, inasmuch as a higher degree of intelligence is required from every soldier by the exigencies of modern warfare, it behoves us to do all that in us lies to cultivate the individual intelligence of soldiers to such a point that, when left to act upon their own responsibility, they may still continue to carry out the *spirit* of the instructions they have received, and not relapse into the helpless condition of a flock of sheep, ready to give way to the impulse of the moment, and to become a prey to disorganization and panic.

Officers, Study of their Profession; Officers, Necessity for Encouragement to Study.—For this purpose, it is abundantly clear that in the first place Officers of all ranks must be deeply imbued with these ideas themselves. It is impossible to carry conviction to the hearts of others unless we have a living faith ourselves in the precepts which we inculcate: the impulse must be given from above, and given in such a way that it will carry conviction with it. Officers must realize that the study of their profession is their first duty, and *should be* their pleasure also, if ambition finds any place in their breasts.

Lack of Encouragement; Its Effect on Discipline.—General Upton gives us a melancholy picture of the Chinese Army, in which he says: "No encouragement is given to the Officers to study the art of war, . . . he is sunk in ignorance as deep as the men, and frequently shows as little respect for law and military discipline."¹

¹ General Upton (U.S. Army), "Armies of Asia and Europe," p. 23.

Training of Cadets.—It should be a matter of the deepest interest to our military authorities to provide such a training for cadets that they may enter the Service not merely qualified to take up the ordinary routine duties which form an important part of every Officer's daily duties, but that they should be impressed at the outset of their career with a desire to excel in their profession, and by close attention to the details of their work, and a conscientious performance of minor duties, set a good example to the non-commissioned officers, and win the respect and confidence of their men.

Importance of Minor Duties.—"The zest with which the so-called minor duties have been for so long a time carried out in the German Army is by no means merely the result of routine or of unproductive pedantry, but is rather due to the moral aim of creating in the soldier's imagination a representation of duty in a manner adapted to his intellectual faculties. The conscientiousness in small things should certainly not be confined to the mere technical details of military life; on the contrary, the many things which do not appear on the surface . . . deserve special attention. A disposition to cleanliness, love of order, punctuality, carefulness, faithfulness, and decision will but contribute to the establishment of good discipline. The custom has hitherto prevailed of leaving certain minor details of administration in the hands of company Officers. This is not done with a view to economy, but in order to strengthen the influence of the Officer over those under him, by means of the intimate intercourse thus produced. This peculiarity in German Army life, in combination with the belief in the necessity of a strict performance of duty, has created a feeling of most complete unity in the ranks. The most complete interdependence between Officers and men has arisen from the zealous performance of duties common to both. The moral force derived from the feeling of interdependence remains firm when the excitement and confusion of battle render control impossible, and regularity, which is the offspring of law, has ceased to exist."¹

The constant intercourse between Officers and men which these minor duties entail afford many opportunities of gaining the affection of the men, and bringing them gradually to look at all their duties from a higher standpoint, viz., as a means towards the great end which all alike have in view—the honour and integrity of the Empire.

Ambition, a high sense of honour, and a patriotic love of duty, are sentiments which are readily awakened in youth; the unformed mind readily adapts itself to the atmosphere with which it is surrounded, and lasting impressions may be made in a few months which bear their fruit in after life, and frequently determine a career for good or for evil. The Officers who are selected for the highly responsible duty of training cadets at our two great military training schools should therefore be chosen because they embody in their own persons the principles which it is desired to inculcate, and because in their

¹ "A Sketch of War as it will be," translated from the German "Das Volk in Waffen" of Von der Goltz. Sir Lumley Graham, R.U.S.I.

own military career they have given evidence that with them these principles are a living faith, and not a parrot formula learnt out of a text book. If such men as these, men who have already begun to earn distinction, and who in the ordinary course will go on until they have won their laurels in many a hard-fought field, if such men pass a few years in training others to follow in their steps, the gain would be incalculable.

Education has never been our strong point in England; whether it be civil, military, or technical, we seem to have an unhappy knack of letting the essence escape us; we do not adapt the means to the end; in fact, few people take the trouble to enquire what the particular end in view may be. "The selection of persons who are possessed of intellectual and physical capacity for the practice of war, and the instruction of persons so selected in approved forms of discipline for the accomplishment of purposes, may be regarded as a matter of the highest national concern. It conduces to the preservation of national independence from the aggressions of foreign force, and on this ground demands the deepest attention of patriotic statesmen and the closest study of scientific soldiers."¹

Spartan Discipline.—With Officers trained on these lines, the discipline of the men would soon be raised to a point never dreamt of under the old *régime*: drills, exercises, and regulations would attain a new significance, and would be carried out with the understanding, instead of being merely conformed to by the letter: we might hope to attain to something like the Spartan discipline of old, which not only enjoined that the will of the Commander should be obeyed as an order, but provided also that the execution should be *animated as an act*; for every soldier comprehended the force of an order, being educated in the art of war, and capable of understanding the aim and object of the movements which were to be executed in face of the enemy. The Spartan phalanx was not merely cemented in its foundation by a well-arranged correspondence of physical power, it was animated throughout by intelligence and devotion to duty. "The young Spartan was enticed to look at things with his own eyes, and to exercise his own mind in all things that regarded his profession: he was, in fact, so trained as to become a man within himself on every point that relates to war. The system of education thus pursued kept him steadily to the point of business, it tried and proved his temper, his obedience, and his courage."²

In fact, it was not so much the actual physical force of the celebrated phalanx which won so many victories for Sparta, but rather the men who formed the component parts of that phalanx.

And as it was in the past so it will be in the future: machine guns, new explosives, and magazine rifles have complicated modern warfare and added to our power of destruction; but these in themselves will not win the day. "Most men who have seen a great deal of war have come to the conclusion that it is not the bullets, or the

¹ Jackson's "Formation, Discipline, and Economy of Armies," p. 1.

² *Ibid.*, p. 35.

bayonets either, but the men, and the hearts that are in the men. You do not sweep away the enemy with your bullets or your bayonets; you do not with your bullets kill all those who are opposed to you, and then walk over their bodies; you do not with your bayonets thrust your adversary through, for the bayonets rarely meet; but what happens is this: one side showing a firm front, courage, determination, and discipline, whatever be the conditions, produces on the other side a sinking of heart, which causes the weaker-hearted to run away. I do not care whether you call it the bullet or the bayonet which is the means to this end, but the real fact is that the side which has the greatest moral force wins. . . . The Officer who makes up his mind that he wants to win in war should endeavour as far as possible to imbibe the spirit of fighting tactics, but above all to conquer the love and confidence of his men. Then, and not till then, everything that he does will have life in it, and he and those whom he commands will be perfectly certain of beating the enemy which is opposed to them.”¹

Difference between Technical and Moral Discipline.—During the war of the American Revolution, the British troops were supported by a contingent of Hessian mercenaries; these latter were far more highly trained and disciplined from a technical point of view than the British troops, and their fighting power has never been called in question; nevertheless, on more than one occasion, it was made abundantly clear that our adversaries stood in much greater dread of our own troops than they did of our mercenary allies; the reason is not far to seek; the Hessians did their duty and no more, that is to say, they acted up to the letter of the contract by which they were bound, but they had no personal interest in the struggle beyond the earning of their daily wage; the British, on the other hand, comparatively raw and undisciplined as they were, were animated with strong personal feelings, they fought with a dash and enterprise born of pride of race and patriotic enthusiasm, and a moral discipline not learnt on the parade-ground.

It must not be supposed, however, that such feelings as these can be relied upon *per se* to win victories against highly-trained troops fighting in a national cause; they form nevertheless a groundwork upon which a very solid fabric may be reared, if tact, sympathy, and intelligent cultivation are brought to bear upon them, and no amount of trouble should be considered too great in such a cause; the Officer who exerts himself to foster these qualities and perfect them to the greatest possible extent will reap a rich reward in the day of trial; when the din of battle is round him, and the enemy pressing him hard, in the deadly breach when support is no longer at hand, and verbal orders are drowned in the deafening crash of the encounter; at such moments each man acts upon impulse, and it is well for him if he can feel certain that the impulse will be *forward*! “Almost every man who has ever led a storming party across the open in full view of the enemy will acknowledge that his prominent and all-

¹ Colonel Brackenbury, R.A., vol. xxxii, p. 456, R.U.S.I.

absorbing anxiety from first to last was, 'Will my men follow me?' He has no shadow of misgiving as to his own courage and determination to lead the way, but the horrid question, and the doubt it engenders, robs him of much of that frenzied enjoyment which is past the understanding of all who have not taken part in such an enterprise. . . . What gratitude the leader feels for ever afterwards to those two or three men who stuck close to his heels, whose eyes met his whenever he looked over his shoulder to see how those behind were following!"¹

Ethnological Considerations.—In order to establish the moral discipline of an army on a firm basis, it is necessary to study closely the idiosyncrasies of its component parts.

Spartan Army.—In the Spartan Army we find perhaps the highest ideal of moral (as well as physical) discipline that has ever been attained. "The Spartans stand alone among nations as conquerors of themselves; they attained through the discipline of their institutions the view of a sentiment which commanded their actions to the right channel, and the right channel only; consequently the genuine Spartan, who was a man at all times, exulted in no success and desponded in no reverse."²

The early training of the Spartan youth, and the whole tendency of their unique social system, combined to form these great military qualities into national characteristics; but in the present day, living as we do in a state of the most complex civilization, and forced to consider all manner of conflicting interests, it would be out of the question to think of training the whole nation on certain definite lines, with a view to taking advantage of the qualities thus developed, in order to graft upon them a perfect system of military discipline.

German Army.—The German Nation and Army approach most nearly in modern times to the ancient ideal, and the conditions which called both into existence are strikingly similar, viz. :—the pressing necessity for individual devotion and self-denial in the great cause of national existence.

In England the necessity does not appear so pressing; the absence of immediate danger and the freedom from foreign aggression causes the nation's pulse to beat slowly, and renders its interest in military matters somewhat languid. We cannot attempt to train the nation, in order that soldiers possessing the desired military instincts may be forthcoming for its defence; we must, on the contrary, take the peculiar characteristics of our soldiers as we find them, and instead of trying to develop new idiosyncrasies, study rather to make the most we can out of the materials presented to us.

British Army.—Our Army is composed principally of three nationalities, English, Scotch, and Irish, each possessing its own salient features.

The Englishman is generally open and manly in character, and

¹ Lord Wolseley on Courage. "Fortnightly Review," August, 1888.

² Jackson, p. 43.

performs his duty faithfully, though, as a rule, without enthusiasm. He is susceptible of correct mechanical discipline, steady in action, cool in temper, and generous to a conquered foe.¹ He is, however, more easily affected by the discomforts of a campaign than a Scotsman or an Irishman, and in case of privation he does not consider the cause with discrimination, but breaks out into a grumble which takes care to make itself heard; in fact, he looks upon it as the duty of his superior Officers to see that he is well fed and more or less well housed, and regards it as no part of his duty to put up with what he considers unnecessary privation, without expressing his feelings on the subject. A good grumble is, however, the English soldier's safety-valve; he is naturally law-abiding, and serious disaffection from such causes as these is not to be apprehended. The Scot (especially the Highlander) is physically better fitted for campaigning than his English comrade, and seldom grumbles at discomfort or privation. He is capable of intense military enthusiasm, and under the influence of the bagpipes will advance to the assault of a position with a sort of frenzy, fighting with a ferocity unknown to an Englishman. He is more vindictive and less easy to control when his blood is up, but is nevertheless cautious in committing himself, and seldom follows a wrong line of action; he is eminently trustworthy, and can be equally depended upon for a night attack, a pursuit, or the assault of a position.

The Irishman is, as a rule, indifferent to danger, careless, and without thought of himself; he is extremely impulsive and requires careful handling; he is brave, but his courage cannot always be relied upon; he is cheerful under the most depressing circumstances, but not infrequently loses heart at a critical moment. He will perform his duty under the most trying conditions as if it were a pleasure, but should he conceive himself wronged, he will cherish a feeling of resentment for months. Discipline is apt to be irksome to him, and is frequently regarded in the light of oppression, instead of being understood for the good of the Service and for the general welfare. He is capable of strong attachments, and is of a lovable, if somewhat unstable nature. His manners are winning, and for this very reason he is sometimes accused of insincerity. The Officer who can command an Englishman's respect, a Scotsman's confidence, and an Irishman's love, is not far removed from being a born leader of men.

Influence of the Commander.—The quality of the Commander is a direct factor in the maintenance of discipline from whichever point of view we regard it, but above all does it make its influence felt in raising the *morale* of the troops from a standard of merely mechanical excellence which seldom rises to higher flights than the bare discharge of duty, to one of lofty self-abnegation which urges a man resolutely to shake himself free from the trammels of vulgar personal interests, and to embrace with enthusiasm every opportunity of earning the approbation of his Commander, winning laurels for his country, and

¹ Instances are not wanting to show that this generosity is often misplaced, *e.g.*, in the Soudan.

by his example in the bivouac, on the march, and in the battle encouraging his comrades to unflinching endurance of hardship and inciting them to great and glorious deeds such as shall point a moral and adorn a page in history for the behoof of those who come after.

No one knew better than Napoleon how to cultivate discipline of this sort; Blücher, after his simple fashion, excelled equally in this respect, though perhaps less intelligently. Both succeeded in implanting a high *morale* in their men, differing not in degree but rather in kind; the former working more with the head, the latter with the heart, but in both cases strong personal attachment to their leader formed the mainspring of action on the part of the men. Wellington was undoubtedly deficient on this score; he did not believe that his men were capable of being actuated by lofty motives; the addresses with which Napoleon could move his men as by magic, or the simple but stirring words with which Blücher could rouse his troops to the highest pitch of enthusiasm, would have seemed to the great Duke "as sounding brass or a tinkling cymbal," and certainly in his mouth would not have been free from a suspicion of cynicism.

Notwithstanding the lack of sympathy which to a certain extent existed between Wellington and his soldiers, the latter were bound to their leader by the strong ties of perfect confidence in his ability, respect for his character, and belief in the justness of his administration.

Want of confidence in a Commander on the part of the men is a far more deadly evil than absence of affection or lack of enthusiasm, for it strikes at the very root of moral discipline, and brings discontent, mutiny, and panic in its train. "What few men, not soldiers, can realize is that quality which Cæsar showed when defeated, by no fault of his own, at Dyrrhacium, or when, after almost all the world had deserted him because of his apparent failure in Spain, he changed the history of the world by his calm facing of misfortune. . . . A man must almost have stood in the position of the General who suddenly sees before him the probability of failure, to realize the strain that Cæsar must have undergone, and the greatness of the mind that, unaffected by fate or chance, could in such circumstances lift the feelings of a whole army from discouragement and despair to victory-giving enthusiasm."¹

Selection of Commanders.—There is not the smallest doubt that the selection of Commanders plays an even more important part in the conduct and issue of a campaign than we are wont to allow; two men of apparently equal mental power may obtain very strikingly different results with the same material. "When two men are put into competition who possess every mental quality in the same perfection, with the exception that one has higher energy, perseverance, and courage, this one will gain the victory. He may be said to possess genius, for genius has been declared by a great authority to be patience; and patience in this sense means unflinching undaunted perseverance. But this view of genius is perhaps deficient; for

¹ Lord Wolseley. "Fortnightly Review," Sept., 1888.

without the higher powers of the imagination and reason, no eminent success in many subjects can be gained.”¹

The slow process of evolution has not greatly changed human nature from what it was in the time of the Roman Empire, and hearts are won in these latter days by the same homely methods that obtained then.

Officers participating in Hardships.—What better example could we have than that of Corbulo in his brilliant campaign against the Parthians: “During the severity of the weather he gave an example of strenuous exertion; he was busy in every quarter, thinly clad, his head uncovered, in the ranks, at the works; commending the brave, relieving the weak, and by his own active vigour exciting the emulation of his men.”²

The late Emperor Frederick of Germany, who in ten years had seen more of war on a large scale than falls to the lot of most men in a lifetime, was beloved by his troops for his fortitude and humanity, and above all on account of his indifference to his own personal comfort, a true Hohenzollern trait. There will be little ground for grumbling when all share alike, for the men will recognize the necessity of bearing their trials and discomforts patiently when they see their leaders in the same straits as themselves, and the idea that they are being neglected, while their Officers are making merry, is one which under such conditions can never find a place in their minds. The following extract from the diary of the late Emperor Frederick, written after the Battle of Königgrätz, is of extraordinary significance: “With straw and the like we made ourselves as comfortable as we could in an empty house without furniture, and, after living on bread and cognac all day, we supped on a loaf of ammunition bread which we had chanced to buy from a camp sutler. We ourselves had been in the saddle from 8 A.M. till 8.30 P.M.”

Intellectual Training: its Increasing Importance.—It must be borne in mind that the battle-fields of the future will inevitably make far greater demands upon the individual capacity of the soldier than those of former days, and his intellectual training becomes therefore a matter of ever-increasing importance. It was sufficiently remarkable in the Mutiny that the sepoys who fought against us conducted themselves at first with the greatest bravery, but being without leaders trained to the science of war, they soon became demoralized; and having no other military qualities themselves beyond courage (amounting to fanaticism), a mechanical skill in the use of their weapons, and a fair proficiency in drill, panic followed rapidly upon the heels of defeat, and a formidable revolt was crushed by a mere handful of men in an incredibly short space of time. The native artillery, however, being more highly trained, and of superior intellectual power, gave us far more trouble than the infantry; the native gunners had learnt to think for themselves, and possessed an individuality which secured for them the most conspicuous proof that

Darwin's “Descent of Man,” vol. ii, p. 323.

² “Tacitus,” Book xiii, sec. 35.

we recognized their ability—in the reorganization of the Native Army which followed upon the Mutiny, the artillery was abolished!

The ill-regulated minds and low intellectual level of our opponents in most of our small wars has enabled us to secure results which would otherwise have been impossible, even with the immense superiority of the weapons employed by us over the ruder implements of our foes. For it must be remembered that, though the advantage in weapons indisputably lay with us on every occasion, yet we could not always claim a like advantage in the matter of reckless personal bravery, or even in fighting discipline considered in its more technical aspect. Zulus, Ghazis, and Arabs have been our foes, and though we may not be willing to admit their superiority on any point, still, few who have seen any or all of these in action will fail to acknowledge a feeling of admiration, not unmingled with envy, for the fierce onslaught, the gallant bearing, and the absolute indifference to death of these fanatical and half-savage warriors.

On the other hand, when we compare our Army with the armies of Europe, we are at once met by a humiliating sense of our own moral and intellectual inferiority.

Conscription.—Continental armies draw their recruits from all classes of society without distinction, the result being that a comparatively higher average of intelligence is maintained, and the interest of the nation at large in the training and well-being of the army is ensured. In England, we pride ourselves on having a voluntary army, but let us not on that account lay the flattering unction to our soul that the majority of our recruits are therefore men fired with enthusiasm for a military career, or even possessed with a patriotic desire to die for their country. Their service is certainly voluntary in the sense that they have elected to earn their living by the profession of arms without any compulsion on the part of the State; but it is involuntary in nine cases out of ten, in the sense that they could not earn a living in any other way. The drafts which were sent out to some of the regiments at the Cape towards the conclusion of the Boer War would be sufficient to dispel any illusions which might exist on this point, and the percentage of these men who were “dismissed with ignominy from Her Majesty’s Service” within twelve months after landing is significant of what we may expect when our Army lights upon bad times.

Recruiting.—A comparison of the recruiting Returns for the years 1867 and 1886 is instructive as showing that with all our reforms, and the immense improvements in the conditions of service which have from time to time been inaugurated (see also Appendix), the general physical and intellectual standard of “those who aspire to wear the Queen’s uniform” has not altered appreciably in the last twenty years. It must further be borne in mind that the year 1886 was one of extreme depression in every branch of industry, so that the returns for that year are more favourable than could be expected to obtain as a general rule.

Year		1867. ¹	1886. ²
Proportion per 1,000 of enlistments.	Labourers	591·6	634
	Artizans	141·6	156
	Mechanics	174·1	121
	Shopmen and clerks	64·8	57
	Professions	6·6	12
	Boys	21·3	20
		1,000	1,000
Rejected as "unfit"		451·46	442

With such materials it is manifestly impossible to attain the same average standard of moral and intellectual discipline as our Continental neighbours have arrived at, though in some cases we may perhaps still compare favourably owing to a more advanced *national* development.

General Upton (U.S.A.), in his report to the United States' Government, says that for any plan of reorganization in the United States' Army to be successful, it must be based first on "the declaration that every able-bodied male citizen, between certain ages, owes his country military service, a principle thoroughly republican in its nature, as it classifies in the same catalogue, and exposes to the same hardship, the rich and the poor, the professional and the non-professional, the skilled and the unskilled, the educated and the uneducated." It behoves us then not to be unduly elated at possessing a volunteer army, but rather to sit down and count the cost. There appear to be three alternatives for us to choose from.

I. Conscription.

II. An honest attempt to meet the difficulty as it stands, and endeavour to so improve the social status and the conditions of service of the soldier as to attract a superior class in sufficient numbers to enable us to reject would-be recruits, for moral and intellectual inferiority, as well as for physical unfitness.

III. To acknowledge that, man for man, our Army is inferior to those of other civilized Powers, and that therefore we had better renounce all idea of armed intervention for the protection of our interests against foreign aggression.

The first of these alternatives does not recommend itself to the nation at large, and could hardly fail to become a purely party question, should it ever come within the range of practical politics; the last is utterly repugnant to all except a small and uninfluential party in the State; the second alternative is thus forced upon our notice for mature and deliberate consideration.

Good Class of Officers readily obtained.—Among the aristocracy and

¹ Royal Commission on Recruiting, 1867.

² Report of the Director-General of the Army Medical Staff for 1886.

upper middle classes, from which the Officers of the Army are principally drawn, the profession of arms is held in high esteem, and so generally is this fact recognized, that many men who would otherwise occupy a somewhat inferior social position are induced to embrace a military career, for the sake of the social advantages it may be expected to confer upon them. This being so, there is no lack of highly eligible candidates for commissions in the Army, though the attraction in the shape of emoluments is notoriously insignificant. It may be urged that there are many young men of good birth and education who can find no congenial employment, and that the Army offers to such a ready means of occupying their time, exercising their faculties, and giving scope to their ambition in a manner calculated to harmonize to a certain extent with their natural inclinations. This argument may readily be conceded, but how is it that similar reasoning does not hold good in inducing the lower middle class, the artisans and mechanics, and small tradesmen, in brief, the classes from which so large a proportion of our volunteer force is recruited, to join the rank and file of the Army?

Good Class of Recruits difficult to obtain.—The pay and prospect of advancement are immeasurably superior to what the great mass of the recruits could hope to obtain in civil life, and certainly appear sufficient to attract a better class than we are at present compelled to put up with.¹

It is true that the percentage of promotions from the ranks is small, but this, far from being a deterrent cause, is actually the result of the extremely small number of enlisted men who, by reason of their education, ability, and breeding, are fit subjects for such advancement.

Political Considerations.—The prejudice and dislike with which the civil population in bygone days regarded the Army, the jealousy and suspicion with which the acquisition of any power or authority by the Army has been viewed since the days of Charles I, and the actual opposition that was offered by so powerful a body as the Manchester school of politicians to the maintenance of any standing army at all worthy of the name, so recently as 1852, all this has left an indelible impress on our national life; the country appeared to regard the Army as something to be ashamed of, and kept in the background, a kind of inferior police force in fact, consisting principally of riff-raff, necessary, perhaps, but none the less objectionable on that account.

Social Considerations.—No man of any social standing whatever, capable of earning an honest living, and gaining the respect and consideration of those who formed the circle of his acquaintance, would have dreamt of "taking the shilling," so long as it was possible to provide food for powder and shot from the scourings of the cities, and to recruit the ranks in the country from among the useless, the worthless, and the dangerous members of the community. The advent of the Crimean War, and the enrolment of the volunteers,

¹ See Appendix.

brought about a change in public opinion, but it was of a somewhat negative nature, and no attempt was made on the part of our legislators to develop the faint enthusiasm thus produced into a truly national sentiment. On the other hand, the disgraceful practices of recruiting parties, the shipping off of batches of gaol birds as drafts for regiments on foreign service, and the rotten "bounty system," flourished with undiminished vigour, and we cannot wonder that the term "red-coat" was synonymous in the minds of most men (and women) with debauchery, drunkenness, and violence, and that no British matron could be found to boast that she had devoted her sons to the service of her country, if the career upon which they had embarked was that of military service; rather was it a cause for grief and consternation, for the Army was scarcely a reputable calling for a young man to embrace.

Matters have doubtless improved in this respect, and the ever-increasing importance of the volunteer movement has done much to familiarize the lower middle and working classes with the idea that the profession of arms is not only an honourable profession, but one in which the nation at large has a direct interest at stake; but old traditions are powerful, and prejudice is wont to take deep root; it therefore rests with the State to lend its powerful aid in undoing the evil that has been done, and by publicly recognizing the official status of the soldier, to improve *pari passu* his social status. These facts have been recognized by many able men, and Royal Commissions have from time to time made valuable suggestions and recommendations, which have to a great extent been acted upon (see Appendix), but only grudgingly and of necessity; reform has been forced upon the State from without, and not emanated from within. In 1861, and again in 1867, a memorandum of the Under-Secretary of State for War, Mr. J. R. Godley, was laid before a Royal Commission on Recruiting; it states that "there are indeed but two possible methods of obtaining a good and sufficient Army, and of keeping it permanently on foot: one is the method of conscription, the other the method of *making the Army a desirable profession for rational men.* The efficiency of the Army is beyond all price, for not only our reputation and our honour, but our existence depends upon it. But it cannot be too often repeated that in the end, and in some way or other, we must give the market price for every man we raise by fair means; and it is far better to look the fact in the face, and accept the inevitable consequences, than to endeavour by all sorts of devices to conceal it and persuade ourselves that we are getting a bargain. I propose, therefore, to increase the pay to the natural or market rate." In 1881 a Committee was appointed to inquire into the conditions of soldiers' service as affected by the introduction of the short service system. It is stated in the Report that "with short service the efficiency of our Army depends more than ever upon our having a sufficient supply of good non-commissioned officers, and to secure this the Committee are of opinion that it will be absolutely necessary to increase the pay; increased pay, with the advantages proposed, should tempt a better class of men to enlist,

with the view of gaining promotion, and making the Army a permanent profession.”¹

The changes from time to time in rates of pay and pension will be found in the Appendix.

Leaving for the present the question of what yet remains to be done by the State, in order to induce a better class of recruit to join the Army, let us consider what can be done from within to ameliorate the soldier's condition, foster his ambition, arouse his sense of self-respect, and by raising the moral and intellectual tone of the individual, endeavour to bring about a corresponding improvement in the tone of the whole society, thus presenting to the country a picture of high moral tone and discipline, which should effectually remove the deep-seated prejudice which has hitherto done so much to keep a desirable class of men out of the Army.

Responsibility.—Responsibility, even in small things, has a direct tendency to bring out the higher qualities of a man's nature, but in order to be a working factor in the social system of an army it must be a living responsibility, carrying with it well-defined functions and powers. The absence of direct responsibility in our Army is a crying evil, permeating every rank; it is born of centralization, and fostered by red tape. A Commanding Officer is hedged around by a ring fence of restrictions, regulations, and returns; instead of the “habit of command” hardening his nerves, training his mind to form correct and rapid decisions, and rendering him a firm and reliable leader of men, he is fain to become “a good office man” first, and a passable drill instructor next; everything is “laid down” for him, all contingencies are provided for; his judgment in administrative matters is seldom exercised, inasmuch as painstaking officials at the Horse Guards have endeavoured to do his thinking for him, and it only remains for him to look up the section and the paragraph of the Regulations which will meet each case as it occurs, and refer any unusual question to “higher authority,” a sufficient amount of correspondence must pass “through the proper channels,” and a certain number of War Office forms must be filled up with becoming regularity. When the system has converted an energetic and enterprising individual into a perfect automaton, under whose administration (?) “everything goes smoothly,” it has done its work; individuality has been crushed, and centralization vindicated; what more could be wished?

The administrative spring being thus contaminated at its source, it would be little short of marvellous were it to become clear and sparkling ere it reached the barrack-room: when the Commanding Officer is converted into an automaton, what chance is there for the non-commissioned officers and men to rise superior to routine and red tape?

Obedience.—It has been said with truth that “the first duty of a soldier is to obey orders,” and it is scarcely assuming too much to say that the higher the intellectual level to which we can train our

¹ Report of Committee, p. 26.

soldiers, the more readily will strict obedience to orders be ensured. There are three causes which contribute to military obedience: the first and lowest is the *fear of punishment*, the second and more reliable is the *hope of reward*, the third and most trustworthy of all is a *clear comprehension on the part of the men of the value of discipline*. Napier says: "Military obedience is the result of reflection—not of blindness—and is invariably found to be most perfect among the most civilized nations."¹

Organization of a Battery of Artillery.—Perhaps the nearest approach to a well-organized distribution of responsibility in our Army is to be found in a battery of horse or field artillery. The Commanding Officer as a Major holds a position which in the cavalry or infantry he could not hope to attain before he reached the rank of Lieutenant-Colonel; this in itself is a stimulus of the most powerful kind to junior Officers, who see the functions and responsibilities of command within measurable distance of attainment; moreover, each subaltern has a direct control over his own division, both in the matter of drill and interior economy; and the non-commissioned officer in charge of each subdivision² has a measure of responsibility which seldom falls to the lot of non-commissioned officers of similar rank in other branches of the Service. Even the "limber" gunner³ has a post of trust and responsibility in which he can distinguish or discredit himself. Again, the "lead" driver not only has his horses and harness to care for, but is selected for that position with a view to his exercising a certain amount of control over the whole team. Thus a feeling of emulation is easily awakened in the breast of the recruit, for he soon sees that the humbler posts of trust and responsibility are within his reach, and when he has once mounted the lowest rung of the ladder the very qualities which are most essential to his further success are those which the nature of his duties in themselves assist to develop. The visible effects of the superior training of the native artillery in the Indian Mutiny have already been alluded to.

Infantry Sections.—In the infantry the *section* has long been recognized as a convenient sub-unit for purposes of drill and fire-discipline, but for administrative purposes it is still in embryo; it is true that the section leader in some regiments is already a man of considerable influence among his comrades, but in the matter of general discipline and interior economy the system has hardly taken any hold, except perhaps at Aldershot. The chief difficulty in the way lies in the attenuated numbers of a battalion on a peace footing, which frequently renders it impossible for a section to have any existence except in name.

Let us bear in mind throughout the object for which we are striving; it is not merely to raise the moral and social tone of the

¹ Napier, p. 11.

² A subdivision consists of one gun with its wagon, detachment, trains, &c.: a division consists of two subdivisions.

³ The limber gunner has immediate charge of the ammunition and stores of the subdivision.

soldier, to cultivate his intelligence, and to foster the qualities of self-restraint and power of initiative; all these are in a sense only means to an end, the end being to attract a higher class of recruits into the Service, by raising that Service in the eyes of our countrymen to the position of an esteemed and honoured profession. Every step will make the work easier, but all must co-operate, and the first move must be from within; reflex action will soon bring other forces into play from without, which will give to the movement all the resistless power of a great social revolution.

Soldiers' Food.—Of the causes which contribute most directly to the maintenance of discipline, one of the most important is a strict attention to the quality and quantity of the soldier's rations. *Mens sana in corpore sano* should be our motto, and there is nothing so certain as that discontent and insubordination, together with an inclination to violence, drunkenness, and crime germinate all too readily in a mind which has a morbid bias, and it is equally certain that an unhealthy or ill-nourished body is directly provocative of a morbid condition of the vital functions, which faithfully reproduces itself in the ill-regulated impulses of a disordered mind. This question has lately aroused much public interest, and official action in the matter appears likely to bring about beneficial results; it is, however, greatly to be feared that the official enquiry will not really touch the root of the evil, though doubtless much benefit may result from it. That $\frac{3}{4}$ lb. of meat per diem is enough to maintain a man in first-rate condition, few will deny; but the meat must be of good quality and dressed in a wholesome and appetizing fashion. We are careful to provide a change of diet for our horses and dogs, and a *menu* of a monotonous character would not be tolerated for a moment in an Officers' mess. Let us apply the same natural laws to the preparation of our soldiers' meals, and evince a little more lively interest in the matter than is shown by the subaltern on duty with his perfunctory "Any complaints?" as he goes the round of the men's dinners. The troops are better fed at Aldershot than they are in any other quarters in the kingdom, because the Commissariat Department there has the entire control of subsisting the troops in its own hands, and is moreover in a high state of efficiency: no middleman comes between the soldier and his food, and the Government obtains the best possible value for the money expended. But in the more numerous cases where the troops are fed by contract, we are presented with a totally different state of affairs: the Government, in the first instance, accepts the lowest tender—about 5*d.* per lb.; concurrently with this the price for fair quality beef and mutton in Smithfield Market averages 6*d.* per lb.; the contractor, however, has to make his contract pay: he farms it out to a number of sub-contractors, who are as well known on the meat market as the sweaters of the East End are on the labour market. Lean Spanish cattle are bought at 4*d.* per lb., the contractor and his myrmidons make their profit; the prime cuts, such as they are, are served out to the married people, and the rest is cooked in the cook-house; the plates of the "duty men" are then piled up with the most succulent

morsels by the willing hands of their comrades, who know the hardship of night duty, and *what remains* must suffice for the "men's dinners." And a remnant it is in good sooth! Scraggy, tough, and unpalatable, small in quantity and poor in quality: it is from this remnant that our scientific men should deduce the number of "foot-pounds" of work represented by the soldier's ration.

The mischievous system of accepting "the lowest tender" is answerable for this state of things: a system which renders honest dealing impossible, and puts a direct premium upon bribery and corruption; yet where shall we find a political Hercules of sufficient moral stamina to slay this official Hydra? We fear that such a one is not bred in the atmosphere of party strife.

It would appear not unreasonable to hope that the increased consumption of wholesome food may be accompanied by a decrease in the consumption of stimulants; should this prove to be the case, there can be little doubt that a great gain would be immediately effected in the cause of discipline.

Supply of Food to an Army in the Field.—The larger question of the supply of provisions to our armies in the field is of a more intricate character, but considering the far-reaching nature of the issues involved, it is one which merits the most earnest consideration. The one great distinction between ancient and modern armies is the organization of the departments of supply, which, in providing for the daily wants of the soldier, have done more to mitigate the horrors of war than all other causes combined. Without them *discipline is impossible*, and an army losing its cohesion, like a swarm of locusts, sweeps over a country, leaving despair and starvation behind.¹

In 1870-71 the inferior discipline of the French troops was in no small measure due to the utter disorganization of the intendance, and it was no secret that the presence of the German troops was actually less dreaded by the French villagers than the proximity of their own countrymen in arms. The frightful demoralization of Napoleon's troops in Russia was in a large measure attributable to the same cause, and never has such terrible retribution overtaken maladministration.

It is not therefore merely the health and strength of our troops which depends upon the successful administration of the departments of supply, but the very cohesion and preservation of the discipline of an army must stand or fall by it. Much attention is being devoted to the subject, but it may be doubted whether the most excellent schemes will be of any avail in the absence of the actual organization required on such a footing as would enable us to put at least one Army Corps in the field, without having recourse to the desperate expedients with which we are familiar even in minor operations.

Military Music.—The effect of music on the march and in battle is very marked: the wearied soldier, staggering along under the weight of his pack, blinded with dust and parched with thirst, listens with

¹ General Upton's Report, p. 95.

sullen indifference to the voice of his Officer urging him to "step out," when suddenly the cheery strains of his regimental march fall upon his ear, infusing him with new vigour. The Highlander who has had all the "go" knocked out of him by a tedious flank march, the object of which he cannot understand, is beginning to get distrustful of his leaders, when the inspiring notes of the bagpipes in a moment bring about a change from an attitude of sulky suspicion to one of burning enthusiasm ; his eye is bright, and his head erect, he feels that the fight is in the air, and that he will be in the thick of it at the critical moment. Who shall depict the change which was wrought in a moment in the feelings of the beleaguered garrison of Lucknow when they heard the strains of "The Campbells are coming" float to them on the fresh autumnal air, announcing the approach of Sir Colin Campbell's relieving force ?

The French, after 1871, tried the experiment of abolishing regimental bands, but they soon reverted to the time-honoured institution, even though it was regarded as a relic of despotism. It is with satisfaction that we note the recognition which military music meets with at the hands of our own authorities, and that it has its rôle assigned to it in the latest instructions for the attack. "On reaching the firing line, the second line will double through it with cheers, carry the position at the point of the bayonet, *the drums beating and the bugles playing.*"¹

It is in truth at a supreme moment such as this that the success of the enterprise may be assured by the inspiring notes of "the charge," when otherwise discipline might have wavered, and hearts failed before the deadly fire of the foe, delivered from a carefully prepared and well selected position. The elation of spirit and elasticity of step induced by the sound of music are factors which cannot be overlooked, either in maintaining the commonplace discipline of the march, or in inspiring the frenzied enthusiasm of the charge.

It may be safely averred that military music might be made to play an important part in rousing a widely extended feeling of martial enthusiasm throughout the country: the time has gone by for keeping our troops in holes and corners as if we were ashamed of having a standing army ; our object should be to put the country in touch with the Army, and by a judicious parade of "the pomp and circumstance" of war, help to awaken the dormant instinct of fighting patriotism which lurks unsuspected in many a British breast. Many of our large towns and country districts never see such a thing as a body of troops on the march, with all the attendant pageantry of glittering arms, smart uniforms, and soul-stirring music ; if the attractive side of soldiering were brought home to our countrymen, aye, and countrywomen too, possibly we should not have to wait long before a manifest improvement became visible in the class of young men "aspiring to wear the Queen's uniform."

Recreation.—In the interests of discipline, it is of the utmost importance to promote such amusements among the men as may conduce

¹ Sir A. Alison's Memorandum to the Troops at Aldershot. Sept., 1888.

to a cheerful frame of mind. The healthful intercourse between Officers and men engendered by cricket, shooting, and athletic sports of all kinds, together with the *esprit de corps* which is aroused by regimental competitions, gives to our Army a force peculiarly its own. "In India this subject receives much attention:—the object of all regimental institutions is to deliver the soldiers from idleness, and give them profitable employment and recreation; A holiday every Thursday has recently been given to them for the purpose of encouraging shooting and other outdoor sports. Notwithstanding the loss of time, it is maintained that discipline is not impaired, but on the contrary improved, through the increased cheerfulness of the men."¹

Physical and Technical Aspects of Discipline.

All training in peace-time should have a direct bearing on the requirements of war. This may appear to be a truism, but in spite of the strides that have been made of late years in the right direction, we are still very far from realizing the full significance of this elementary truth. The most radical changes in furtherance of this object have recently been inaugurated in the German Army, but these changes are of a far more sweeping character than would be possible under any except a practically autocratic military government. The leading idea in the new German drill regulations is not merely to subordinate all military exercises to the actual requirements of war, but strictly to limit the instruction to such forms of drill as can be learnt with readiness and precision, and practised with certainty in the field.

Training of Instinct by Habit.—The *instinct* thus acquired by habit can be depended upon in the most trying circumstances, to a far greater degree than any carefully reasoned out line of action produced by conscious cerebration. To learn alternative methods of arriving at the same result under slightly different circumstances may be a valuable exercise for the reasoning faculties, but reason backed up by experience tells us that the man who hesitates is lost, and it is far better for men to be so trained, that they may be impelled to act upon a common impulse in any given situation, even though the action so taken may not be the best possible under the circumstances, rather than that they should be moved by no impulse at all.

What to do, and How to do it! The whole question is contained in these few words. "How to do it" must be the burden of instruction in peace-time, and no efforts should be spared on the part of the Officers to inculcate the lesson in all its bearings upon the men, in such a fashion that when they are told "what to do" in the face of the enemy, there may be no doubt or hesitation, no waiting for detailed instructions as to how the end in view is to be arrived at.

Control by Training and not by Words of Command.—It is not meant here to advocate looseness of control on the part of the Officers over

¹ General Upton's Report, p. 68.

their men, but rather that the soldier should be so trained that obedience to the *will of the Commander* should be a common instinct, animating Officers and men with a kindred spirit, and creating an irresistible impulse upon any given object which could never be imparted by mere words of command.

General Napier gives a striking illustration of the difference between the blind obedience of the well-drilled Russians, and the dashing impetuosity of the more intelligently-trained British troops under the command of the Duke of York. "A redoubt was to be carried by storm, and he ordered three Russian regiments to make the attack. They marched up steadily under a heavy fire, and found a deep ditch with palisades in it: the Russians halted, looked at the obstacle for a few seconds, and then retired. A second and a third time these Scythian automatons were marched up to the attack, and again and a third time they retired with great loss; brave, stupid, and *blindly obedient*." Three *companies* of British light infantry were then despatched with the order to "take the redoubt. . . . The Englishmen advanced at a rapid rate, ran up to the edge of the ditch, halted an instant to contemplate the unexpected defences below, and then intrepidly leaped down; away went the palisades with a crash, while cheered by their own animating shouts, the victors sprang upon the parapet and the redoubt was taken! Here we have real obedience. The redoubt was to be taken. The Russian slaves did not take it. The English freemen *did* take it. Their obedience was perfect; it was not blind, it was glorious!"¹

What we should endeavour to aim at is to assimilate the conditions under which our small manœuvres and field-days are organized to the actual conditions of war, and thus render our troops familiar with the unforeseen contingencies which are inseparable from all military operations. We may be pardoned for taking another leaf from ancient history, in referring once more to the Spartan system of military training, in which the soldier "was presented in the course of his education with most of the contingencies which happen in war; and from this cause perhaps, when in action, he often seized the reason of a thing *as it were by intuition*."²

It has been said that we have made great strides of late years, and this is true, both as regards simplification of drill and adaptation of military exercises to the requirements of war. The work done at Aldershot within the last twelve months being of a character which defies criticism: above all the following innovations stand out in clear relief, and stamp the authors of them as men in whose keeping the future of the British Army is secure:—

1. *New Attack Formation for Infantry*.—The new attack formation for infantry is not only a model of simplicity and clearness, which every soldier can understand, but it is based upon deep reflection and sound reasoning; the duties of the component parts of the attacking force are simply and forcibly put, and it is pointed out

¹ Napier, p. 12.

² Jackson, p. 37.

that "the supports and reserves keep the firing line at its most efficient strength . . . and encourage those engaged in front by the feeling that there is a body of comrades following to assist them."¹ How well this meets Lord Wolseley's view of the most severe test to which the courage of a soldier can be put: "Will my men follow me?" is the question which is never absent from the Officer's mind; and so it is with the first line of the attacking force advancing across the open at a rapid pace in skirmishing order: the feeling of confidence engendered by the shoulder-to-shoulder formation of earlier days has been lost, and it must be replaced by the assurance that supports and reserves are following, and that when the fire crisis arrives "the second line will double through the first, and carry the position at the point of the bayonet."²

But in order to ensure this feeling of confidence, the practice of the attack in peace-time must be habitual: the skirmishing line must be accustomed to the never-failing appearance of the second line at the decisive moment; there must be no doubt in the minds of Officers and men as to whether the required support will or will not put in an appearance at the critical juncture; it must be so much a matter of course that the distracting doubt can never for a single instant throw its shadow between the first line and the objective upon which its whole soul should be concentrated. Most of us will acknowledge that even in peace manœuvres and at field days this doubt *does* arise, and that a feeling of anxiety as to the successful pushing home of the attack will not infrequently assert itself. Now if this be the case in a matter of drill in peace-time, where the worst that we have to fear is a rebuke from the General or censure from the Colonel, what would take place in action, when issues of the gravest importance hang upon the success of a well-delivered assault? Doubt will breed hesitation, the men will begin to look about them and fire wildly, the highly strung nerves will become flaccid, and the energy of the attack will have expended itself before the objective point is reached: discipline can be maintained at high pressure only for a short time, and if success be not assured before the inevitable reaction of nervous exhaustion sets in, panic and disaster will supervene.

Length of Bayonet.—Great stress has been laid upon the advantages of a long bayonet, and we have always made a point of giving our men longer bayonets than other nations have deemed necessary; as though battles were fought by two lines of men standing opposite to each other and prodding at their foes with the carefully regulated motions of the bayonet exercise, the successful issue resting with those who have the advantage in length of cold steel. Let us grant for the sake of argument that a hand-to-hand fight with the bayonet on a large scale may possibly take place; which side is likely to get the better of the encounter, the one which has marched and manœuvred all day, carrying a long and proportionately heavy bayonet, or the one which has had the advantage of a lighter weapon

¹ Sir A. Alison's Memorandum to the Troops at Aldershot. Sept., 1888.

² Sir A. Alison's Memorandum.

to carry, and is consequently able to use it with greater dexterity and energy when the march, the manœuvre, and the attack formation have culminated in the hand-to-hand encounter? The question of a light weapon is of importance as regards the physical strain which the soldier has to bear, but beyond this the discussion is purely academic, inasmuch as battles are not won by bayonet thrusts, but by an undaunted determination to go for your adversary without pausing to count the cost, and this determination is the offspring of discipline.

When the attack formation is practised throughout the Army with the same assiduity as "marching past" or "advancing in review order" we shall feel that our men are being trained in the discipline which is required for war, and that the drill-ground is indeed and in truth the nursery for the battle-field. The importance attached to purely parade movements in the British Army was commented upon by some of the Continental representatives at the Delhi Camp of Exercise, in terms the reverse of complimentary.

2. The *night operations* which have recently formed so important a feature in the Aldershot curriculum are certain to be of the highest value. Those who have taken part in night operations on active service, even on a small scale, cannot fail to have been deeply impressed with the "jumpy" feeling which more or less seems to pervade all ranks, under the novel and undoubtedly trying conditions by which they find themselves surrounded. There are not wanting instances of how readily this "jumpy" feeling may be converted into panic, and military authorities appear pretty well agreed upon the hazardous nature of such undertakings, while at the same time recognizing their ever increasing importance.

But why should "night operations" be so extremely hazardous, why are men's nerves in such a state of unusual tension, and why should apparently well-disciplined troops deteriorate so readily into an undisciplined mob? There are several minor causes which it is not necessary to enumerate, inasmuch as they are well known and recognized; but the dominant cause is *want of practice*! Neither Officers nor men are accustomed to carry out the simplest operations at night, they are unable to recognize the ordinary landmarks which in daylight are familiar objects, they cannot distinguish a horse from a cow, or a stunted bush from a crouching Zulu; the eye has never been trained, and the confidence which arises from *use* is never acquired; a nameless dread of the unknown saps the very foundations of discipline, and causeless panic follows quickly upon a disturbed and morbid state of the reasoning faculty; the most commonplace occurrences assume an exaggerated importance, and ordinary risks are distorted into dangers of the most menacing proportions. The remedy for all this lies in accustoming troops to perform night operations of every description under varying conditions of atmosphere and ground, until use, which is second nature, shall have taught them to regard such operations merely as a necessary and not unusual feature of their military training. It will be objected by some that exercises of this description are too harassing in their nature to be made the

subject of frequent instruction; the same objection might be applied with equal force to many of the conditions of military service; but if it be granted that night operations are likely to be an essential feature of almost every future campaign, then we must face the question boldly, and so conduct our peace-training that it may accustom Officers and men to the requirements of war.

It is, of course, most desirable to avoid harassing troops unnecessarily, and every effort should be made to render the work in question as little distasteful as possible, by careful provision for the men's bodily comforts, relaxation of routine duties, and when feasible a reduction of the night guard, picquet, and sentry duties; above all, the Officers must not look upon it as a "bore," they must, on the other hand, use every effort to impart an air of reality to the work, and thus arouse and sustain the interest of their men; hard work is essential to success in every walk of life, and as soon as Officers show a disposition to shirk hard work and avoid disagreeable duties, the discipline of the Army begins to suffer. Zealous performance of all duties by the Officers is accompanied by cheerful acquiescence in their necessity on the part of the men; "every hardship which appears useless in the common-sense view of the soldier annoys him, but he will cheerfully bear even greater hardships when he can understand the necessity."¹

Unusual efforts, however, demand unusual concessions, and a little latitude in the matter of short furloughs and other small indulgences, during the "drill season," might be conducive to a general appreciation of the advantages likely to accrue from a well carried out system of night drills.

3. The latest and not the least practical innovation is the "system of casualties" on field-days, and if the system be carried out thoroughly and honestly throughout the Service, there is every reason to believe that enormous advantage may be expected to accrue from it. Not only is it useful in accustoming all ranks to the sudden assumption of responsibility in the field, and the performance of functions appertaining to a rank above them at critical moments; but it is likely to prove a valuable means of bringing to the front both Officers and men who possess in a high degree the qualities of presence of mind, quick perception, and bold initiative. It is, in fact, a training of the highest order, for it gives Officers a means of accustoming themselves to the unexpected discharge of new and generally higher duties, and commanding men over whose actions they had previously no control, and it accustoms all ranks to the unhesitating transference of their obedience at a juncture when the maintenance of discipline may be everything, and any rude shock to its supremacy may bring demoralization and disaster in its train.

Desirable though it may be thus to accustom Officers and men to the unexpected changes of command which must inevitably occur *in all ranks* when in action, it is not to be inferred that the voluntary employment of small detachments from various corps is to be

¹ Goltz, p. 13.

encouraged on service; necessity is the only justification for such a proceeding, inasmuch as it strikes at the very root of *esprit de corps*, and directly enhances the very risks which it is desired to minimize by the "casualty system." "It is of primary importance that the formations to which men have been accustomed in peace should be preserved in war, for their disruption will always have a prejudicial effect on discipline, and the mischief thereby caused almost always outweighs the advantages which may be derived from breaking up tactical units so as to increase their number."¹

Troop and Company Training.—The training of troops and companies under their own Officers for a period of one month every year is an institution of the greatest value to all ranks in the cavalry and infantry; the excellent programme issued for the guidance of Officers commanding troops and companies leaves little to be desired, except the hearty co-operation of all ranks in endeavouring to secure as much advantage as possible from the work done during the period. It is of supreme importance that Officers should not look upon the programme for the military training as "something to be got through," and the diary as "something to be filled up;" the programme is a guide which will assist a zealous Officer to arrange the time at his disposal in a systematic manner, and get the full value for himself and those under him out of the exceptional advantages placed at his disposal; the diary is the official record of the work done, and should be a source of pride and satisfaction to all concerned when completed; moreover the keeping of a diary under such conditions is a most valuable exercise, and an Officer of zeal and intelligence can make something more of it than a mere official report to show that he has not omitted anything which was laid down in his instructions. It is to be regretted that the artillery should not be associated with this military training; subaltern Officers would gain great advantage from exercising their divisions in detached duties for the earlier part of the training, and acting in concert with a troop of cavalry or company of infantry during the latter portion of the time.

Use of Arms.—The importance of assimilating the conditions of our field exercises in peace to the exigencies of war has been already alluded to, as accustoming Officers and men to the requirements of active service; it is, if possible, of still greater importance to render every individual so familiar with the practical use of his weapon under these conditions that he may be imbued with the perfect confidence which springs only from habitual and successful employment of his arm, and which no amount of manual exercise or mere target practice will instil. It must be constantly impressed upon men that a well-disciplined body of troops accustomed to act in unison, and thoroughly capable of handling their arms, is practically invincible. Nor is this far from the truth; for provided that such a body be intelligently handled, whether in the attack or on the defence, it will most assuredly succeed in the work that lies before it. The ease with which the groups of German infantry repulsed the furious onslaughts of the French cavalry at Woerth, the defeat of the French infantry

¹ Goltz, p. 10.

by the German artillery at Amanvillers, and the brilliant but costly success of the German cavalry at Mars-la-Tour are instances which will ever live in the page of history. Not less glorious are some of the records of our own troops in recent as well as more remote wars, nor less instructive are some of their failures.

The training of our men to the use of their weapons in each arm of the Service becomes a matter of greater importance in proportion as the potentiality of the weapon is increased. We have machine-guns capable of discharging 600 bullets from a single barrel in one minute, and magazine-rifles capable of making 15 per cent. of hits in the hands of good marksmen at a range of 2,800 yards. To employ the former to advantage, a cool head, steady eye, and practised hand are required; and to render the fire of the latter fully effective "fire-discipline and steadiness are essential, and the careful training of company and section leaders and all junior non-commissioned officers is becoming of more importance every day. . . . With ill-disciplined troops, not trained in fire-discipline, and badly commanded, a magazine-rifle might prove a curse instead of a blessing."¹

Marching.—In England the artillery is the only arm that gets any practice in marching worthy of the name, the regular gun-practice and periodical reliefs furnishing all that is required during the summer months; the "flying columns" periodically sent out from Aldershot afford an opportunity on a small scale to all arms of practising and testing their marching powers. During the winter, however, considerable benefit might be derived from a regular system of forced marches arranged in concert with the three arms upon a well-considered strategical basis. A twofold object would thus be gained, the more mobile cavalry and artillery benefiting more especially by the practice in varied strategical combinations, and the training of their horses in wind and limb; while the infantry would not only gain in actual marching power, but would learn to form a far higher estimate of its own capabilities than would be the case if they were allowed to remain comparatively dormant. "Exertions which previous experience has taught to be nothing out of the common way are more easily borne than those of which we have no previous knowledge."²

The march of Sir Frederick Roberts from Kabul to Kandahar was accomplished without mishap, because the men were in a high state of physical training, and most of the Officers had some experience of transport work. The march of the IInd German Army from Metz to the Loire, though commenced by easy stages, was productive of numerous casualties on account of the hardships the men had recently been exposed to, and the loss of marching power consequent on the recent siege operations; after the first week, however, although "the marches became much more severe, they did not produce the same bad effects, because the men gradually recovered their tone and the *habit of marching*."³

¹ Colonel Slade's Report.

² Goltz, p. 32.

³ *Ibid.*, p. 33.

On active service soldiers should be taught to look upon an average of 20 miles a day for a period of two or three weeks as nothing out of the way; Murat, in his march from Jena, *viâ* Prenzlau, Zirbeck, and Posen, to Warsaw, kept up this rate of marching for six weeks! The army whose marching discipline is most perfect starts on a campaign with heavy odds in its favour. The most brilliant combinations will fail unless troops are in the right place at the right time, and Officers of all ranks cannot be too deeply imbued with the idea that if they want their men to excel in great things, it is their first and most important duty to see that they are not unnecessarily harassed and worried about small things. A soldier can stand a great deal if he realizes its necessity, but discipline can scarcely be maintained under the severe trials of a campaign if unnecessary fatigue and hardship have to be endured. There are two most conspicuous dangers which confront us in this connection:—

1. The deeply-rooted conviction, which is ineradicable in some minds, that troops must parade hours before they are required to move off, in order that the innumerable petty inspections may take place before the arrival of the Commanding Officer. The men are wearied, both physically and morally, before the real work of the day commences; for it is not so much the number of miles marched, but the length of time men are kept under arms which wears them out; and not only so, but the wearisome delay between “turning out” and “moving off” robs the enterprise in view of half its freshness, and blunts the keen edge of warlike ardour; the spirits of the men are dejected, instead of being buoyant, and the motive power is dissipated. On service, the same results will ensue from apparently different causes; the men will not be kept standing on parade hour after hour for the purpose of maintaining intact every link in the chain of inspection, but an overpowering anxiety will assert itself to have the troops under arms long before the time has arrived at which it would be necessary to start for the appointed rendezvous, or to take the allotted place in the column of route. The bivouac may, perhaps, be a mile from the point on the road where a given brigade has to join the marching columns at 8 A.M.: the brigadier orders his brigade to parade at 7; the Colonels order their battalions to be under arms at 6.30 for their regimental parade; the company Commanders, influenced by the contagion of over anxiety, inspect their companies at 6, and the men themselves are turned out at 5.30: thus, not only do the troops lose nearly two hours’ rest, which their efforts the previous day may well have earned for them, but the time so lost is spent *standing under arms*, an occupation which unfits them at the outset for the trials of the coming day. The man who worries himself will worry everyone around him, and a Commanding Officer with an ill-balanced mind, in occupying himself too fully with unimportant details, generally fails to grasp the essential and salient features of the circumstances by which he finds himself surrounded.

2. The second danger which has to be avoided, if we would keep our men in good fettle on the march, is an over anxiety for security, keeping the troops in a state of restless and exhausting preparation

for attack from all possible quarters. Now if the reconnaissance service be properly carried out, there can be no necessity for splitting up the marching columns to form patrols, flankers, scouts, &c. Troops on the march are perfectly ready to deploy for battle; the breaking up of a force into small detachments, for the purpose of forming an ideal marching formation, emanates from the study and not from the field: what is required is to keep the marching columns intact and free from harassing duties; special troops are told off for reconnoitring, and if this important function be properly carried out, there is no need for any anxiety as to the security of the march. In order to create a well-recognized and uniform system of carrying out marches in an enemy's country, the method already proposed can be made available in time of peace, special attention being devoted to taking immediate action upon the receipt of reconnaissance reports, and bringing our forces into such formations as the nature of the report may appear to dictate. The combinations which might occur are of sufficient variety to offer the widest scope for the exercise of presence of mind and coolness of judgment in the Commander. The object of the march must be kept steadily in view, and the reconnaissance reports rapidly sifted and arranged, in order to arrive at a correct conclusion. To what extent is the march likely to be interfered with? Is it a mere demonstration on the part of the enemy to harass the marching columns, or is a serious attack threatened? Will it be advisable to detach a few troops to make a counter-demonstration, or should a good position be immediately selected in which to receive the threatened attack? Is it desirable to bring on a general engagement, or to avoid one? These and a hundred other questions must be decided at short notice by the Commander, and on his prompt and correct estimate of the requirements of the situation everything will depend. If these things are studied and *practised* in peace, they will not be new and strange in time of war: Commanders will feel confidence in their power to deal with each situation as it arises, and will not endeavour to hedge themselves around with elaborate and harassing precautions which can have no other result than that of unnecessarily distressing the troops, and rendering them less able to cope with the enemy when they meet him.

It must not be concluded that careless indifference and reckless exposure are advocated; but it is desirable to draw a clear distinction between the functions of the two bodies of troops which form the component parts of an army; the object in view for the marching columns is to spare them all unnecessary fatigue, to husband the men's physical strength, and keep their *morale* unimpaired, to keep the objective clearly before their minds, and thus while advancing rapidly upon the enemy's position to enter upon the decisive ordeal of battle with impetuosity and ardour. The object in view for the reconnoitring troops is, on the other hand, *not* to spare themselves for the fight, but by the unremitting exercise of a vigilance which makes heavy calls on mind and body alike, to preserve the marching columns from all anxiety as to their security.

Details affecting Discipline on the March.—"There are no occasions

upon which the discipline of a regiment becomes more conspicuous than on the line of march, nor any on which the attention and vigilance of every Officer in maintaining order and regularity, are more especially requisite."¹

The question of carrying the men's packs is one which has frequently to be considered; as a rule, the soldier should be accustomed to carrying everything himself which is laid down by Regulation as part of his personal equipment; but if extraordinary efforts are demanded, Commanding Officers must use their discretion in the matter of relieving the troops of a portion of the weight ordinarily carried. If once men begin to feel that they are being called upon to perform impossibilities, discipline will be at an end; the soldier thinks that his Officers cannot or will not realize the hardships which they so cheerfully call upon him to endure, the bond of sympathy ceases to exist, and sullen resignation is soon followed up by open insubordination. In most of our small wars these facts have been taken into consideration; thus in Sir Frederick Roberts' march from Kabul to Kandahar, the rate was $15\frac{1}{2}$ miles a-day over broken country, and the weight carried was $33\frac{1}{2}$ lbs.²

The Royal Irish covered 120 miles in six days in their march to Metemneh, and carried 38 lbs.³

The Germans have lately reduced the weights carried by the soldier from 64 lbs. to 52 lbs., and at the same time increased the average rate of marching for peace manœuvres from 25 to 32 miles a-day. The English soldier's normal load is a little over 62 lbs., which is about the average for all the Continental nations, exclusive of Germany.⁴

Individual Training.—The physical and technical training of the individual are of considerable importance, but any attempt to develop extraordinary excellence in the individual may not impossibly result in the indifferent development of the whole body; to march well and to shoot well are qualities of the highest order in the soldier. It is not, however, the shooting of individual marksmen, or the marching of a few trained athletes, which wins the day, but rather the uniform action of entire bodies of troops, working harmoniously under the will of the Commander. Above all, it must be clearly understood that though our efforts should be largely directed towards cultivating the moral individuality of the soldier, anything which tends to *independent* training should be carefully avoided. "The word 'independent' should be cut out of every regulation and drill book. Every action can be classified under the head of 'individual' and 'mutual' action; the independent training of men is an evil that cannot be too strongly repressed."⁵

Tacitus records the formation of a Roman legion composed entirely

¹ Wolseley's "Pocket-book," p. 336.

² Journal R.U.S.I., vol. xxv, p. 315. Extracts from Divisional Orders by Lieut.-General Sir F. Roberts, p. 19.

³ Journal R.U.S.I., Callwell's Prize Essay, vol. xxxi.

⁴ Journal R.U.S.I., vol. xxxi, p. 903.

⁵ Mayne's "Infantry Fire Tactics," p. 418.

of gladiators, and draws attention to the fact that in spite of the extraordinary physique and fighting power of every man in the ranks, it could not compare in actual efficiency on service with the legions which were filled up in the ordinary way.

A fighting unit is not a mere aggregate of fighting individuals, it must have an individuality of its own. This can be called into existence only by applying the lessons of training and discipline to it as a corporate entity, and sustained by ever subordinating the instruction and development of the individual to that of the body of which he is merely a member. By this means not only is a higher average of excellence ensured, but a powerful *esprit de corps* is fostered, which encourages the weaker members to renewed exertions for the credit of the corps, and incites the leading spirits to unceasing efforts to raise the standard of excellence yet higher.

Guards and Sentries.—Night guard is one of the most trying duties which a soldier has to perform; it is, moreover, a duty which is viewed with dislike and undertaken with reluctance, especially in peace-time, when the necessity is not always apparent. It has been stated that of late years night duty has been considerably reduced, but the statement is scarcely borne out by the Returns, which show the number of "nights in bed" which fall to the soldier's lot in most of our garrison towns. It is possible that in many cases there has been a distinct reduction effected, but inasmuch as this reduction has merely followed upon a diminution in the effective strength of battalions on a peace footing, the net result leaves us very much where we were before.

From being accustomed to a certain number of guards and sentries, we have come to look upon them as indispensable, and many Officers will be found to uphold the theory that it is an excellent training for the men. A necessary training it undoubtedly is, but it is one which should be kept down to the lowest point consistent with the maintenance of good order; for unlike other drills and exercises in time of peace, the habitual performance of sentry duty does not increase the efficiency of the sentry or develop the faculties of vigilance and alertness which are essential to the satisfactory performance of his functions on service. There is nothing more certain than that familiarity breeds indifference and contempt for what cannot fail in peace-time to become a more or less routine duty. It does not require an adept in the art of "breaking out of barracks" to elude the vigilance of a sentry, neither would the most indifferent thief hesitate to back himself heavily to steal anything, from a horse to a rifle, under the very nose of the guard or picquet. A remarkable illustration of this was furnished by the case of a sentry at Gibraltar, who was found "asleep on his post" by the Officer on duty. The non-commissioned officer of the guard was ordered to take his rifle away without awakening him, and to return to the guard-room for the "relief" after completing his rounds, upon which the defaulting sentry was to be marched back and placed in confinement. Upon the return of the Officer with the non-commissioned officer and relief, the sentry was found walking about "in a brisk and soldier-like manner,"

with his rifle in his hand! Years afterwards the soldier took his discharge, and at the urgent request of his Officer told "how it was done." Immediately after the departure of the Officer he had awakened to a sense of something unusual, and missing his rifle had promptly divined the cause; he clambered down the rock by a way he had been accustomed to take when birdnesting, and reached the guard-room before the non-commissioned officer; he remained in hiding until his rifle had been deposited in the guard-room, the relief marched off, and the guard had resumed their slumbers, and then stealthily making his way to the door, abstracted the rifle, and rapidly regained his post, where he was found by the non-commissioned officer on his arrival by the more circuitous path, wide awake, in possession of all his faculties, and above all of his own rifle!

A sentry who sleeps on his post on service is liable to the punishment of death; in peace-time the same crime is not infrequently punished by a few days' confinement to barracks.¹ How then can peace training in this case be any preparation for war? It must indeed be the reverse, for the frequent performance of a duty which, in nine cases out of ten, is a mere matter of routine, only teaches the soldier to look with indifference upon the same duty in the field, though in the latter case it may be of vital importance to the safety of an army.

Fatigues.—Everything which takes away men from their drill is detrimental to their military training. This has been recognized so far that during the annual squadron and company training the men are struck off all other duties; but this is done at the expense of the regiment, which is employed during the period of training in furnishing the usual fatigues, guards, escorts, &c., with reduced numbers, and thus regimental or brigade parades become an impossibility. That this should be so is much to be deplored. The zeal of Commanding Officers and the spirit of regimental discipline is impaired to a serious extent, and the evil cries loudly for a remedy. The remedy is to be found in a determined and united effort to grapple with the difficulty; guards must be reduced, and fatigues brought down to a much lower minimum than now obtains. The latter question can scarcely be discussed here in detail, but if an instance be required where a saving of labour might be effected, the absurd system of "coal-carrying" will furnish it; to employ a number of men with tin pannikins in drawing and distributing coal to the various barrack-rooms, cook-houses, &c., instead of furnishing each regiment with a small hand-cart which would enable one-tenth of the men to do the work in half the time, with a quarter the labour, is such an evident misappropriation of force that it needs no comment. A procession of coal-carriers is a satire on the common sense of our administration!

¹ The latest instance of this crime which came under the writer's notice was in August, 1888. The prisoner was weighed off by the C.-O., the punishment awarded being 10 days' C.B.

Penal Aspect of Discipline: Military Law.

The power of law in promoting efficiency and maintaining a high standard of discipline in an army is set forth with remarkable clearness by Herodotus in his admirable analysis of the fighting value of various races. Of the Lacedæmonians he says: "When they engage in single combat they are certainly inferior to other men, but *in a body* they are not to be equalled; . . . the law is their superior; . . . they are obedient to what it commands, and it commands them never to fly from the field of battle, whatever be the number of their adversaries. It is their duty to preserve their ranks, to conquer, or to die."¹

In considering the question of crimes and punishments, we are confronted at the outset by the manifold aspects under which the same crime may appear, meriting in each case an entirely different degree of punishment. We may, in fact, divide crimes broadly into two categories, moral and military, subdividing the latter into those which are committed in peace-time, and those committed on active service. With social law we have little or nothing to do; the military man who commits offences against society brings himself within its cognizance, it is true; but inasmuch as social law has for its object the gradual development of a rational and moral state of society, by the steady application of certain principles calculated to assist the natural process of evolution, it can have little in common with military law, the object of which is to bring the will into subjection, and to secure implicit and instant obedience under all circumstances. The most serious military crimes are usually those against discipline, not those against morality; for whereas, in the former case, an apparently trivial act of disobedience on the part of an individual may place a whole army in jeopardy, in the latter case probably little or no injury is inflicted on the community at large, and the criminal is an object of execration more by reason of the crime committed, than on account of the injury inflicted on society. "Military obedience must therefore be enforced by a more powerful stimulant than that of social law; a stimulant so strong as to overcome the natural inclinations of men, and produce instant obedience under all circumstances, however trying they may be."²

Thus, in civil life a man considers himself grossly wronged by another, or perhaps he is bullied by one placed over him, who, "dressed in his petty brief authority," makes life unbearable to those under him: if the injured man should take the law into his own hands, and administer a sound thrashing to the object of his aversion, he is probably fined "forty shillings": in military life, a soldier under similar circumstances gives a non-commissioned officer a black eye; this is not a common assault upon the person of the non-commissioned officer, it is a dire offence against discipline, and must be punished with sufficient severity to impress upon all the enormity of the offence.

¹ Beloe's "Herodotus."

² Napier, p. 10.

Again, the different light in which the same military offence may be regarded according to whether it be committed on service or in peace-time might be illustrated by the crime of desertion; in the latter case, three months' imprisonment might be considered an adequate sentence, in the former, the deserter would almost inevitably be shot.

Administration of Military Law in Peace-time.—Military Law is administered by the Commanding Officer or by a court-martial, the jurisdiction in either case being strictly limited and clearly defined. There has been a growing feeling of late years that the sentences of courts-martial are frequently too severe, and a corresponding desire to place more power in the hands of Commanding Officers: it is undoubtedly an instance of great moral progress in the Army to find that whereas in former years the power of the Commanding Officer was limited for fear that he might abuse it, in the present day, on the other hand, there is a strong tendency to give greater power to the Commanding Officer with a view to securing a more satisfactory administration of justice than can be obtained at the hands of a court-martial. A court-martial can only take cognizance of the evidence brought before it in determining its *finding*; in considering its *sentence* it must be guided by the regulations drawn up for the purpose, and influenced to a certain extent by the documentary evidence as to character and previous convictions. A Commanding Officer, on the other hand, if permitted to exercise considerable discretionary power, both as to the degree and the mode of punishment, stands in a more advantageous position; he knows the character and disposition of the prisoner intimately, the circumstances which led to the crime and its probable consequences as affecting the discipline of the regiment are before him as he considers the case, and he is able to administer justice in the *spirit* of the law, whereas the court-martial finds it almost impossible to do more than stick conscientiously to the *letter*.

Some years ago, a certain regiment obtained an unenviable notoriety for disorderly conduct in the garrison town where it was quartered: a picquet had to be sent out nightly to maintain order and bring in defaulters; this duty fell heavily on the well-behaved men of the regiment, and instead of having the desired result, appeared to increase the evil: the Commanding Officer then determined only to employ men upon this duty who had been convicted of disorderly conduct, breaking out of barracks, or being late for tattoo: the experiment was successful, and in a few weeks all crime of this description had practically ceased. At the next inspection, however, it was pointed out that the course pursued was not in accordance with military law, and that in future such offences must be dealt with in strict accordance with the Queen's Regulations!

A similar case occurred recently in one of the Colonies, during an epidemic of small-pox in the villages surrounding the quarters of a certain Highland regiment. The men were ordered to keep within certain bounds, but several cases of disobedience occurred, with the inevitable consequence that the delinquents had to be kept in quarantine with a guard over them, for fear that they might have brought

infection with them : this quarantine duty became at last so serious an infliction upon the well-behaved men, that the occasion demanded exceptional measures. The Commanding Officer thereupon issued an order that whenever a man was convicted of breaking bounds, the company to which he belonged should furnish the quarantine guard : this departure from the "duty roster" met with perfect success, and its legality was not afterwards called in question.

In each of the above cases the method of treatment was exceptional and suited to the peculiar circumstances, and each case is illustrative of a principle, the observance of which goes far towards checking the habitual commission of minor offences. In the former case, the employment of defaulters on extra duty for the prevention and detection of crime, with a view to sparing the well-behaved men, and at the same time making it to the direct interest of the defaulters to check further irregularities, is a principle which might well obtain a wider recognition than is possible under the present regulations. The Queen's Regulations allow of defaulters being "employed on all fatigue duties to the fullest possible extent with a view to relieving the well-behaved soldiers from these duties,"¹ but the widest stretch of the imagination could not class "night picquet" as a "fatigue," and though "the precise nature of the duties to be classed as 'fatigues' will be defined from time to time at each station, by an order to be issued with the approval of the Secretary of State for War, by the General or other Officer commanding,"² it is to be feared that sufficient latitude does not exist to meet the numerous cases which occur for the application of the principle advocated.

In the latter instance quoted, we have the company made immediately responsible for the good behaviour of the men composing it, and this appears to be a principle capable of the widest extension, and likely to be productive of the best results. Give a company or section a direct interest in the good behaviour of the men composing it, and a very powerful stimulus to co-operation for mutual comfort is at once established. It may be said that the same argument holds good for a regiment as for a section or company, but such is not the case, for if the extra duty falls upon a smaller unit, its incidence is more severely felt than if it is evenly distributed by roster throughout the whole regiment : besides which, in the latter case it is felt that it is the "same for all," and there is no call for the special exertion and individual effort which are brought into play in the case of the smaller unit : moreover, the men of a section or company are in a position to exercise a more direct influence over each other, and the immediate control of the non-commissioned officers is a more powerful factor than would be the case if the question were a regimental one.

"In European armies, discipline is principally maintained by granting to the Commanding Officers of every grade, *and even to the non-commissioned officers*, the power to inflict, within certain limits, summary punishment for all minor offences."³ In our Army, the

¹ General Order 185. 1887.

² "Queen's Regulations," s. viii, p. 34B.

³ Upton, p. 320.

power of inflicting punishment is vested almost entirely in the Commanding Officer: it thus happens that many comparatively trivial offences, which, however, call for prompt suppression, are brought before the Colonel, when they might equally well have been dealt with by the Captain, or even by a subaltern or non-commissioned officer: the result is that considerable lapse of time occurs before the delinquent is weighed off, and the Commanding Officer, reluctant to make an entry in the defaulter book without very good reason, "tears up the crime." Moreover, *promptness* in punishment is always more effective than severity, and it would seem highly desirable that junior Officers and non-commissioned officers, who are responsible for the discipline and smartness of even the smallest body of men, should have some little discretion in the matter of minor punishments; this would increase their authority, and at the same time bring home to them a truer appreciation of the responsible functions which they are called upon to exercise.

Marching Order.—The punishment of "marching order" appears to be a mistake; it is most undesirable to make any part of a man's military duty a punishment, unless it be for a careless performance of that particular duty, such as additional "sentry go" for irregularity on his post when sentry. This may appear to be at variance with what has already been advocated regarding picquets, &c., but it is not so, for in that case the duty is performed for a specific and useful object, the punishment lies in being told off for a duty from which well-behaved men are exempt. In the case of pack-drill, the punishment is of the treadmill type, and a military exercise is degraded into serving the purpose of a mechanical punishment. Fatigues and the drudgery of the barracks should take the place of pack-drill; nothing so surely rouses a spirit of sullen discontent as the performance of an absolutely useless punishment, from which no benefit can possibly accrue to anyone. For this very reason, however, the advocates of pack-drill, shot-drill, and the treadmill maintain that such punishments best serve to deter men from crime; this seems, nevertheless, to be an entirely illogical conclusion, for, in the first place, the punishment is of a routine nature, not calculated to strike terror into the heart of would-be evil-doers, and in the second place, the intense mental and physical weariness and moral disgust which are aroused in the breast of the defaulter leave him in a frame of mind which readily lends itself to the commission of further irregularities.

Preventive measures are, however, of infinitely more value than the most perfectly administered penal code, and inasmuch as idleness is the most prolific source of drunkenness and crime, it behoves Officers of all ranks to endeavour to provide rational employment for their men's leisure time; even duty can often be placed in an attractive light before the men, and if Officers are themselves zealous and interested in their duties, much may be done to draw closer the bond of union between themselves and their men both on and off duty, and thus facilitate such measures as may appear feasible under different circumstances for keeping the men "out of mischief."

Adjutants' Duties.—The "Adjutant's parade" is vicious in principle

and unsatisfactory in practice, it is a direct encouragement to young Officers to shirk their duties, and interposes a third person between the company Officers and their men, who has more to say to the discipline and training than anyone else in the regiment; moreover, it is most detrimental to the establishment of that regular intercourse between men and their Officers which should be so highly prized by all who love their profession. This is not as it should be, the duties of the Adjutant should be principally in the office, and the term of his appointment reduced to two years; undue influence on his part would then become impossible, and the junior Officers would all have a reasonable prospect of securing the appointment in their turn by showing zeal and ability in the drill and administration of their companies, and thereby qualifying themselves for a post which is in itself a most necessary training for the higher ranks of their profession.

This principle has already been recognized to a limited extent, the length of tenure of office for an Adjutant having been reduced from five years, with a possible extension of two, to a term of four years, which "under very exceptional circumstances may be extended for six months."¹

Statistics of Crime.—It is always a rash proceeding to place too much faith in statistics, and there are doubtless many cases in which the apparent absence of crime may be due in some measure to its "screened existence;" still, a comparison between the Returns of crime for the years 1883 and 1887 would appear to show that our efforts are tending in the right direction, and that the more lenient punishments which have obtained latterly have been productive of good results.

General FitzWygram's Return, showing percentage of crime in the following corps.	General courts- martial.		Other courts- martial.		Minor punish- ments.	
	1884.	1887.	1884.	1887.	1884.	1887.
Household Cavalry .....	..	..	2·3	1·1	49·0	49·7
Cavalry of the Line	0·02	..	6·8	4·3	86·0	80·6
Royal Artillery	0·016	0·03	7·7	6·7	104·0	92·0
Royal Engineers .....	..	..	3·7	2·3	85·0	57·5
Foot Guards .....	..	..	6·4	4·9	179·0	142·8
Infantry of the Line	0·06	0·03	7·6	6·5	168·6	139·4
Total average for all arms .	0·04	0·02	7·2	6·0	146·3	123·7

Defaulter Sheets.—It is not an uncommon case to find a man who has started badly in one station ready to turn over a new leaf in another; or perhaps upon transfer from a regiment at home to one abroad, a similar desire to start fresh may assert itself: every

¹ Pay Warrant, 1887, p. 52.

encouragement should naturally be afforded in such a case, and yet, do what we will, there is the defaulter sheet, that silent witness of past misdeeds, hanging like a mill-stone about his neck, with its terrible record of "previous conviction" confronting him at every turn. He may have succeeded in shaking off his old evil associations, and resolved to turn over a new leaf in his career, but the record of past misdeeds he can never shake off, and a new leaf in the defaulter book can only be turned over for the purpose of making fresh entries. It would be far better only to keep a three years' record of crime and to tear up the first sheet on the completion of four years' service, the second sheet after five, and so on in rotation, thus placing a man always within measurable distance of having "a clean sheet." Again, upon transfer from one corps to another, it would only be fair to let a man start entirely afresh; we do not exact characters when we enlist men, why then should there be any necessity for a character to accompany a man upon transfer? Such a system could hardly fail to exercise a salutary influence even upon the worst characters, and need not affect the present system of rewards for good conduct, inasmuch as a record of *good* service could always be kept throughout a man's career, and would bear witness to exceptional merit.

Crime on Service.

In war-time, the administration of military law is attended with many difficulties which have not to be reckoned with in time of peace. In the first place, it is of more urgent importance that discipline be maintained, and that the means taken to enforce it should be short, sharp, and decisive; in the second place, we are much restricted in our choice of measures by which to bring about the desired result. Success in war may be traced to many causes, and one of them is the maintenance of discipline by the judicious administration of military law, and a proper observance of "the customs of war."

The most conspicuous example of the results to be achieved by a judicious and impartial administration of military law, together with a strict observance of the customs of war, is furnished by the untarnished career of the Duke of Wellington; whether we consider the Peninsular Campaign, the Battle of Waterloo, or the Army of Occupation of 1815, we are fain to acknowledge that history has never recorded any more conspicuous instances of signal success in the maintenance of discipline, under circumstances of extreme difficulty. The most certain demoralization inevitably overtakes an army when its relations with the inhabitants in an enemy's country are not kept under control; the slightest laxity encourages license of every description, discipline is in abeyance, the troops become demoralized, and not infrequently the most fearful reprisals follow. In striking contrast to Wellington's Army of Occupation stands Napoleon's Grand Army of 650,000 men, collected for the invasion of Russia in 1812: of mixed nationality, governed by no uniform military code, and animated by motives of the most opposite character, 400,000 effective soldiers entered upon this great enterprise; never was there an

occasion for a stricter observance of the customs of war, and stringent administration of military law, and never was there an occasion upon which these necessary factors in the success of a great enterprise were more completely disregarded. "Authority was weakened by the commingled service of troops regulated by no common impulse; discipline became relaxed, insubordination produced all its disorganizing consequences; confusion and want prevailed; pillage destroyed the resources, for there were no magazines provided, and exasperated the peasantry, who were further infuriated by the wanton and outrageous desecration of their churches and sanctuaries. . . . The march through Prussia, a friendly country, had been a disastrous infliction upon the population; . . . devastation now became atrociously savage and terror general. The march from Smolensk had been accompanied with the most barbarous destruction and disorder of every kind. Even the towns which they were occupying were set on fire with recklessly mad ferocity and disregard of their own interests. Nothing was respected; a demon spirit raged and revelled with exterminating fury, preparing a day of vengeance no less savage and calamitous. All the towns, villages, and hamlets were abandoned as the columns appeared. . . . Moscow was deserted! . . . On the evening of the day of entering Moscow, September 14th, Murat bivouacked his troops outside the city to prevent pillage, but numbers of soldiers entered it after dark, and disorder and riot of every kind were indulged in. That night Moscow was in flames!"¹

On the 23rd October the memorable retreat from Moscow commenced. "And now, in their awful extremity, the wretched soldiers of Napoleon, maddened with their sufferings, had to reap the harvest of revenge they had sown, by outraging and ill-treating the population of the country. The Russian peasants—their homes destroyed, their churches desecrated, their lands waste and ruined, their beloved Moscow in ashes—turned with savage ferocity on those at whose hands they had thus suffered. The first excesses of Napoleon had been met with retaliation by the Russians; excess was repaid by excess, outrage by outrage, until every trace of civilization had vanished from the conduct of the combatants, and a demoniacal frenzy infuriated French and Russians alike."²

Never was retribution more awful and more complete; out of the mighty host which had crossed the Niemen on the 24th June, with 800 guns, only 400 infantry, and 600 cavalry with 9 guns, recrossed it on the 14th December. And yet throughout the long agony of that retreat not a voice was raised against Napoleon by the suffering wretches whom he had brought into this strait, so strong was the personal affection, amounting almost to adoration, which his soldiers felt for him.

Surely no contrast could be sharper or more instructive than this: Wellington, ever sceptical about personal attachment, relying only on

¹ Letter from General Sir Robert Wilson, British Commissioner with the Russian Army.

² Tovey, "Laws and Customs of War," p. 158.

discipline, and crowning the successes of the British arms in the field with unfading laurels; Napoleon, worshipped by his army, knowing well how to play on its passions, and to kindle enthusiasm to the point of frenzy, relying only on his splendid military genius and ignoring discipline, and bringing ruin and destruction, such as the world had never seen, on the armies of France.

An armed force in an enemy's country is an aggregation of human beings brought together for the avowed purpose of killing their foes; under such circumstances the fiercest passions are called into play, and the ordinary restraints of peace-time are insufficient to curb them. It is a time of high moral and physical pressure, the torrent of passion is set free, and it rests with the Commander to determine whether the terrible force at his disposal shall find its legitimate outlet in patriotic devotion and daring gallantry; or whether, bursting the bounds of discipline, it shall pour itself forth in rapine, murder, and destruction. The seeds of insubordination, cowardice, marauding, and desertion are latent in every army; let no leader flatter himself that human nature is any different now to what it was in the days of the Roman Empire; the surface may be more highly polished, but the staple is the same, and apparent differences are in degree, and not in kind; let him rather see to it that these seeds be not allowed to germinate, for then, indeed, he had need to be a Hercules to slay the hydra-headed monster, which but a short space back was in embryo, but which, while he yet hesitated to crush it, has all in a moment sprung into the full vigour of its fearful strength.

Flogging.—Flogging was abolished in the British Army by Act of Parliament in 1879–80 (44 & 45 Vict., c. 9, s. 6). In the Army Discipline and Regulation Act, 1879, corporal punishment on active service, to the extent of twenty-five lashes, was authorized, but in the Army Act of 1881 this paragraph is cancelled, and “the lash” disappears finally from our category of punishments. Flogging on active service was recognized as a ready means of inflicting “summary punishment,” but it may be doubted whether it was really as efficacious as it was held to be, and history proves beyond doubt that the reduction of sentences of corporal punishment and its final abolition have gone hand in hand with a steady improvement in discipline. Many will still be found to maintain that the power to inflict the punishment was in itself sufficient to check crime, but they are confronted with the fact that since its abolition crime does not appear to have increased. Whether it is that its abolition has been instrumental in attracting a better class (morally) of men into the Army, who were hitherto deterred by the knowledge that such a punishment could be inflicted on them, or whether other causes have been at work to bring the result about, certain it is that discipline is maintained quite as easily without the lash as was ever the case when it was employed.

During the American rebellion “there was scarcely a regiment (American) in which corporal punishment in some form was not *daily* administered, and this arose from no desire to violate the law, but from a necessity to which many representatives in Congress can

testify. Even the expedient of the Field Officer's court-martial failed in its object, for when troops were on marches there was no time to take evidence and make out proceedings. When therefore stragglers and marauders returned to their regiments, the Colonels adopted the sure and expeditious process of pronouncing a punishment which, being brief in its character, allowed the offender to be restored speedily to duty,"¹ a strong argument, apparently, in favour of flogging; but did the punishment effect its object, viz., the re-establishment of discipline and the *prevention* of further crime? Evidently not, for the punishment was *daily* inflicted! Would not the punishment of death, inflicted in the first case of desertion, marauding, or insubordination, have served as an example which would have obviated the necessity for flogging, by deterring would-be evil-doers in the future from incurring a like penalty?

The example of the celebrated Roman General Corbulo, in the campaign against the Parthians, during the severe winter already alluded to, is deserving of study. We are told that "the hardships were such that the Army suffered from desertion. . . . The practice of lenity towards the first or second offence, which often prevailed in other Armies, would have been attended by dangerous consequences. He who quitted the colours suffered death as soon as taken; and this severity proved more salutary than weak compassion."²

The attempt at a compromise for the abolition of flogging in our Service by the introduction of "field imprisonment, No. 1 and No. 2," is a halting admission that summary punishment is necessary on service; and yet it is far from meeting the requirements of the case; "such summary punishment shall be of the character of personal restraint or hard labour;"³ possibly it may be a useful addition to our category of punishments, though it by no means goes to the root of the difficulty.

Discharge with Ignominy.—Previous to the abolition of flogging, there seems to have been an invincible prejudice against the punishment of "discharge with ignominy," principally on the grounds that a "Queen's bad bargain" could, by gross and continued misconduct, obtain what he most desired, viz., his discharge. But this argument does not go beneath the surface; the object of punishment is not to wreak vengeance on the evil-doer, it is to improve discipline; and though it may readily be conceded that "discharge with ignominy" is no punishment at all to a notoriously ill-conducted soldier, it nevertheless rids the Army of a man whose services under no circumstances are likely to be of the slightest advantage to his regiment, and whose daily example and influence will certainly do more to spread disaffection, insubordination, and crime among his comrades than the most severe punishments could be efficacious in counter-acting; in fact, a man who takes a flogging well was not infrequently exalted into a kind of hero among a certain class of men, and Officers of experience will be found to assert that the example of such an one

¹ Upton, p. 359.

² Tacitus, Book XIII, sec. xxxv.

³ Army Act, 1881. 3, 41 (5).

is actually infectious. It seems therefore advisable that on active service crime of the nature indicated should be punished according to its degree, either by *death*, or *discharge with ignominy*, the latter being preceded when possible by a sentence of imprisonment; in either case the pernicious influence of the criminal is removed.

Death.—It is best to face the question boldly, and putting aside all sickly sentimentality, acknowledge that for *serious* offences of the nature indicated, there is but one punishment, and that is—"death." When the slightest tendency to this class of crime evinces itself on service, the lesson must be short and sharp, and administered with no uncertain hand. It goes without saying in these days, when every conscientious act for the good of the country can be metamorphosed into a crime for party purposes, that the General who sanctions the extreme penalty of the law may be subsequently arraigned for murder. Be it so; he has not shrunk from facing the enemy in the field, let him not shrink from the angry clamour of interested politicians at home.

The following statistics bearing on this subject are of special interest, inasmuch as they refer to the years when flogging was permitted, cancelled, and superseded by field imprisonment, the Army being engaged in active operations in Afghanistan and at the Cape of Good Hope during the greater part of the entire period:—

	1878.	1879.	1880.	1881.
Death .....	..	..	..	..
Corporal punishment	29	545	25	14
Corporal punishment with imprisonment...	4	50	13	1
Field imprisonment (summary punishment under sec. 44 (part 5), A.A. 1881) .....	..	..	..	3
Discharge with ignominy .....	..	..	..	42

For the ten years previous to 1878 there were eleven punishments by death.¹

Flogging was abolished in peace-time in 1868; its *total* abolition was negatived in the House of Commons by—

120 votes to 60 in 1876,
164 " 122 " 1877,
239 " 56 " 1879.²

Minor Offences on Service.—With reference to minor irregularities on service, it is particularly desirable that Commanding Officers should avoid "creating crime," *i.e.*, framing petty orders of a harassing description, and enforcing trivial regulations with a stringency which should only be applied to matters of intrinsic importance. When an

¹ General Annual Return of the British Army, 1880-81.

² Haydn's "Dictionary of Dates."

order has been issued by superior authority, however unreasonable or faulty it may appear, it is the duty of all Officers to loyally carry it out; there must be no questioning or grumbling. Let every Officer in such a case remember that he is doing something more than carrying out an order of which he disapproves, he is setting an example of discipline! Hesitation in obeying orders, or an ill grace in carrying them out on the part of an Officer, will sow the seeds of indiscipline among the men, seeds which, under the influence of hardship and danger, will bring forth their fruit all too soon, and spread with frightful rapidity through an army.

Officers who make a point of participating as much as possible in the trials which their men have to undergo obtain an influence over them which they often do not realize. The British soldier loves fair-play, and when it is once brought home to him that the Officer who shares his hardships and his glories, participates also in the shame of his misconduct and feels acutely that it is one of *his* men who has gone wrong, he argues that "getting into trouble" is a piece of base ingratitude to the Officer from whom he has received nothing but kindness and encouragement, and upon whom he has learned to look with something of the feeling of a comrade. It is not unusual for a soldier to put restraint upon his passions and inclinations, not from *self-respect*, but from the respect and affection which he bears to his Officer.

Rewards.—The question of rewards should go hand in hand with that of punishments: much has been done to put a premium on good conduct, both in peace and war; but in the latter case it is of the utmost importance that rewards for conspicuous merit should be as *summary* as the punishments for conspicuous breaches of discipline. A reward, like a punishment, loses half its value if we are dilatory in administering it. "It is to be hoped," says Lord Wolseley, "that in our next campaign the General Officer Commanding may have the power to confer the ribbon of the Victoria Cross on the spot, subject to Her Majesty's approval afterwards. . . . A reward conferred on the spot is doubly efficacious; it is more highly prized by the recipient, and has a greater influence upon others to go and do likewise."¹

It is a favourite saying with some persons, when an act of conspicuous gallantry has been performed in the field, that the man who has so distinguished himself "did nothing more than his duty," and that no special reward should be given to anyone for doing that which it was his duty to do. Such reasoning implies an absence of insight into human nature; it is human nature to wish to be appreciated, and to receive visible tokens of that appreciation.

Moreover, we are careful to award the appropriate punishment for the smallest breach of discipline, why, then, should not equal attention be bestowed on the distribution of appropriate honours and rewards for the courageous performance of duty under exceptional circumstances? Why not legislate for discipline in the observance as well as in the breach? No duty can be more distasteful than that of

¹ Wolseley's "Pocket-book," p. 6.

bringing a delinquent to justice, and awarding punishment for crime; and surely no duty can be more agreeable than that of bringing to light every instance of meritorious conduct and obtaining for it the appropriate reward. The men are made of the same flesh and blood as their Officers, they, too, have aspirations and ambitions, and we should endeavour by every means at our disposal to encourage those aspirations and foster that ambition by the judicious and *timely* bestowal of honours and rewards, thus introducing into our Army a spirit of reverence and affection for its glorious traditions, which will do more to safeguard its honour than the most impartial administration can ever effect by the use of repressive measures for the punishment of crime.

Summary.

An attempt has been made to indicate the lines upon which successful endeavours to improve the discipline of our Army may be expected to travel, and considerable stress has been laid upon the importance (I) of cultivating a high moral and intellectual standard, (II) of training our Army in such a manner in peace-time as may ensure the acquirement of habits calculated to form correct instincts for war.

I. It has been already stated that much prejudice formerly existed in the minds of the lower middle class against the Army, and that this prejudice is slowly dying out; it has been, however, and still is, a factor of the first importance in preventing a flow of desirable recruits into the ranks. In districts where the Army is well known this prejudice is not found to exist to the same extent as it does elsewhere, and this is borne out to a certain extent by the comparative ease with which the Royal Marines obtain a first-rate class of recruits from Hampshire, Dorsetshire, Devonshire, and Cornwall, while other branches of the Service in attempting to tap the Midlands find themselves obliged to put up with what they can get. A closer intimacy between the Army and the civil population of the country could not fail to be productive of the best results, and instead of having to be content with "corner lads" we should be able to *select* our recruits for moral and intellectual, as well as for physical fitness. It is well known that the only corps (exclusive of Marines) which is able thus to select their men is the Household Cavalry; no "recruiting" is required to fill up its ranks, and aspirants to the honour of serving in it have to get their applications backed up with certificates of character and general fitness, such as would astonish men in other branches of the Service; moreover, the Officers make a point of bringing up promising young men of good position from the country places with which they are themselves associated; the result of this system makes itself evident in the Annual Return of Courts-martial and Minor Punishments, known as "General FitzWygram's Return," and the following abstract for the years 1884 and 1887 will be found instructive:—

	Per cent. of average number of troops.			
	Courts-martial other than General C.-M.		Minor punishments.	
	1884.	1887.	1884.	1887.
Cavalry of line, Artillery, Foot } Guards, and Infantry of line.. }	7·1	5·6	134·4	116·5
Household Cavalry	2·3	1·1	49·0	49·7
Foot Guards	6·4	4·9	179·0	142·8

The average for the two years shows that the Household Cavalry had one-fourth the number of courts-martial and two-fifths the number of minor punishments recorded by the other branches of the Service; there were no general courts-martial, and what is specially significant is the fact that the Foot Guards, surrounded by much the same conditions of life as the Household Cavalry, have practically the same average of crime as the rest of the Army. There can be no clearer proof that the social standing and moral character of recruits previous to enlistment exercises a most direct influence on the discipline of the corps to which they are posted.

The pay of our soldiers, and especially of our non-commissioned officers, has advanced substantially of late years, until it has reached a point which offers a very fair and honourable livelihood to a man of ability and good character, and bears comparison with the rates which obtain in the open labour market; rewards for good conduct or gallantry in the field are more numerous and substantial than have ever been offered before; punishments are lighter, and Officers are more willing to interest themselves in the welfare of their men; in fine, the conditions of service are infinitely more attractive now in every particular than they were twenty years ago, and yet there is practically no indication that the Army is able to tap a higher stratum of society than of yore. The creation of a reserve appears to be largely responsible for this state of things, and has a threefold bearing on the question:—

1. Reserve service makes the Army unpopular, inasmuch as employers of labour are shy of engaging men whose services they may be deprived of at a critical moment, and the very fact of a man possessing high qualifications actually renders it more difficult for him to obtain employment as a reservist, since for that very reason he is more difficult to replace at a moment's notice than a mere labourer would be.

2. However anxious a man may be to make the Army his profession and earn a pension, he cannot be *certain* that he will be permitted to re-engage; consequently, if he has ability and character, he casts about for a surer means of earning his living.

3. The perpetual drain caused by men passing into the reserve after a tour of short service necessitates the yearly enlistment of a far greater number of recruits than was the case under long service conditions; under these circumstances we may fairly congratulate ourselves that the Army has not actually deteriorated, and see in this fact evidence that the improved conditions of service have not been without a tangible result.

It may be questioned whether the establishment of a reserve at such a cost as this is worth the sacrifices which have to be made for it; and though there are many excellent features in the short service system, it appears that a modified system which would permit of men enlisting for long or short service, according to their own pleasure, *provided that they could prove themselves to be desirable candidates*, would be productive of such results to the *efficiency* of the Army that the consequent loss in *numbers* to the reserve could be faced with equanimity.

II. *Mobilization*.—India is our great training ground, Aldershot and the Curragh our small training grounds; beyond these is “outer darkness.” The country is rocked in a cradle of fancied security by the vaunted possession of two army corps. It would be eminently instructive if the Secretary of State for War would present a balance-sheet to Parliament every year, showing in actual figures the number of Officers and men, horses, guns, and carriages required for the war establishment of two army corps on one side; and on the other side the numbers which we can actually muster together, with the balance debit, showing the numbers required to complete.

And now with regard to the mobilization of our two army corps, complete in every detail on a war footing:—The training effected by such an operation, in every grade and every department of the Army, would be worth volumes of carefully compiled statistics or alternately alarmist and reassuring essays in our journals and magazines: the experience gained in every branch of military duty would be simply invaluable. Why is it not done? Is it on account of the expense? Or is it because we know it would be a complete fiasco? The Admiralty have lately had the courage to put the efficiency of the Navy to a practical test, though even this was not done without having recourse to many expedients which would certainly be impracticable in time of war. Let us never forget the terrible disasters of the French in 1870–71 were entirely due to a false estimate of their strength, the military machine was not in working order, figures and statistics had been employed to conceal the true state of affairs, and the country, deceived as to its resources, clamoured for a war which was to be its ruin. The extent of our annual manœuvres is not sufficient to embrace more than a fraction of our Army or to test the efficiency of its various departments. We hear a good deal about the “chain of responsibility,” this in our Service seems to be interpreted into the passing on of orders, reports, &c., “through the proper channel;” what we really require is the proper allocation and distribution of responsibility, and the confidence in its exercise which can only result from practice. Not only should conspicuous merit be recognized, but

incapacity in *every rank* should meet with its deserts. The story told by a spectator at the German manœuvres of a cavalry regiment charging through a line of guns under the most impossible conditions is suggestive of the practice that obtains in the German Army. "That regiment will be lost," said a bystander: "The Colonel will," significantly remarked a Staff Officer, in reply. It is a doubly mistaken kindness to show undue leniency to incapable Officers, not only is it detrimental to the troops under his command, but it is discouraging to other Officers who might be creditably filling the same post. But in imposing penalties on inefficiency, it must never be forgotten that training and experience are necessary to secure efficiency, and that an Officer should not find himself thrown out in the race because he displays a certain degree of incapacity to deal with circumstances of which he can have had no previous experience, but only because he has shown himself incapable under all circumstances of profiting by the experience which he has had ample opportunities of acquiring.

Subaltern Officers.—Some allusion has been made to the part which junior Officers have to play in promoting and maintaining discipline, and the importance of instilling sound notions on this subject into cadets, so that when they obtain their commissions, even if much good has not been done, at any rate there will be little evil to undo. Subaltern Officers may be divided roughly into two classes:—

1. Those who hug a sense of irresponsibility, and look upon every military duty as a disagreeable accident, inseparable perhaps from the nature of their profession, but none the less irksome.

2. Those to whom success in whatever they undertake is the guiding star of existence; thoroughness characterizes everything they do, and a desire to excel seems to pervade the very air they breathe; ambition is with them a living force, and responsibility is eagerly invited and warmly welcomed in whatever shape it may come. Such Officers form the very backbone of an army; they respect orders and carry them out in the spirit as well as in the letter, they work hard to secure efficiency within the circle of their influence, they set an example to the non-commissioned officers which the latter are not slow to follow, they infuse a spirit of reality into the routine duties of every day, and communicate some portion of their own personality to all who come in contact with them.

Commanding Officers may do much to encourage the latter category and reduce the numbers of the former; it is, however, to be feared that in many regiments the excellent provisions contained in paras. 8, 9, 10, Sec. 7, of the Queen's Regulations, are practically a dead letter; there are too many Officers in command of regiments who prefer to win a little cheap popularity by being extremely easygoing to gaining the more solid advantages which would accrue to their corps by consistent and conscientious efforts to train their subalterns in accordance with the spirit of the Regulations.

Finally, it is not by sweeping changes in administration or radical reforms in drill that we can expect to bring the cultivation of discipline to perfection, but rather by inspiring all ranks in the Army with a spirit of zeal and love for the noblest of all professions. Let the

State set the example by taking a warm interest in the Army and showing a fixed determination to secure its efficiency in every detail; let us hear no more of rotten clothing and indifferent weapons, and drafts sent on service who have never fired a shot; let the money due to a soldier's next-of-kin be paid over to them instead of being published in "the Official Gazette;" let every Officer and man be made to feel that his countrymen are doing all in their power to put him on the most advantageous footing possible as regards pay, clothing, equipment, and administration, to welcome him when he returns from distant stations or from hard-fought campaigns, and to help and protect those who are dependent on him with a willing hand and loving heart should his life be sacrificed in the service of his country. Then, duty will cease to be thankless, the glorious profession of arms will cease to be degraded by the admission of ne'er-do-weels into its ranks, and every Officer and man will feel that England not only "expects every man to do his duty," but is ready and willing *to do her duty too*.

APPENDIX. SCHEDULE A.
Table of Rates of Pay under various Royal Warrants.

Royal Warrant, 1848. — Ranks.	Cavalry of the line.		Infantry.		Other payments.	Stoppage.	Remarks.	Rewards.	Pensions, maximum.	
	s.	d.	s.	d.					£.	d.
Sergeant-major, regimental	3	6	3	0			Under this Warrant, only the head-dress, tunic, trousers, and boots were issued free, and the item for clothing and necessaries charged to the soldier was extremely high compared with the same item at the present day. The voyage round the Cape to India was much preferred to the shorter route, as it enabled men to save a little money to purchase the necessary kit, instead of starting in debt.	2,000 <i>l.</i> was annually granted under this Warrant for annuities for distinguished or meritorious conduct to sergeants, which was held while serving and with pension.	2	6
Troop sergeant-major	3	0	...	...					2	0
Quartermaster-sergeant .....	...	...	2	6					2	3
Colour-sergeant .....	...	...	2	4					2	0
Paymaster-sergeant	2	2	1	10					2	0
Ditto, after seven years	2	8	2	4					...	...
Regimental orderly-room clerk ..	2	2	1	10	Beer-money, 1 <i>d.</i> per day all ranks.				2	0
Ditto, after seven years	2	8	2	4					...	...
Armourer-sergeant	2	2	1	10					2	0
Saddler-sergeant	2	2	...	...					...	...
Hospital-sergeant	2	2	1	10					2	0
Ditto, after ten years	2	8	2	4					2	0
Trumpet- or drum-major	2	2	1	10					2	0
Sergeant	2	2	1	10					...	...
Corporal	1	7½	1	4	G.C. pay after 5, 10, 15, 20, 25, and 30 yrs., from 1 <i>d.</i> to 6 <i>d.</i> per diem.				2	0
Private	1	3	1	0					2	0
Boys up to fifteen years of age ..	0	10	0	10					1	6
Trumpeter or drummer	1	7	1	1½					1	1

Under Royal Warrant, April, 1854, a limited sum was allowed annually for gratuities for long service and good conduct; this sum averaged about 20*l.* per annum, the gratuity for sergeant being 15*l.*, corporal 10*l.*, private 5*l.*, to be distributed amongst those recommended each year.

By Royal Warrant, Jan, 1860, the long service medal, *without gratuity*, was granted to a further number thus:—

Each Bde. R.A. 3.
 Every 900 men R.E., 3.
 Each regt., inf. or cav., 3.

APPENDIX. SCHEDULE B.

Table of the Rates of Pay of all Ranks of the Cavalry during various Years.

Rank.	1861-62.		1867-68.		1876-77.		1881-82.		1887-88.		Rate of Pensions, 1888.
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	
Regimental sergeant-major ¹	3	8	3	8	3	7	..	..	..	..	After qualifying service—
Quartermaster-sergeant	3	2	3	2	3	1	4	2	4	2	2s. 9d., with increase up to 9d.
Colour-sergeant and troop sergeant-major	3	2	3	2	3	1	3	10	3	10	do.
Paymaster-sergeant	2	4	2	4	2	3	2	8 ²	2	8	do.
Regimental orderly-room clerk	2	4	2	4	2	3	2	8 ²	2	8	do.
Armourer-sergeant	2	4	2	4	2	4	..	..	2	8	do.
Saddler sergeant .....	..	..	3	4	3	3	..	..	5	6	do.
Army Hospital Corps sergeant	2	4	2	4	..	..	..	..	..	..	..
Sergeant	2	4	2	4	2	3	2	8	2	8	2s. 3d. do.
Corporal	1	7 ¹ / ₂	1	7 ¹ / ₂	1	6 ¹ / ₂	2	0	2	0	1s. 8d., with increase up to 5d.
Private	1	3	1	3	1	2	1	2	1	2	1s. 1d. do.
Boys under 18 years .....	..	..	..	..	..	..	0	8	0	8	..
Trumpeter or drummer	1	5	1	5	1	4	1	4	1	4	1s. 1d. do.
Sergeant-major ¹ (<i>Warrant Officer</i>) .....	..	..	..	..	..	..	5	4	5	4	From 3s. 0d. to 4s. 6d., with
Lance-sergeant .....	..	..	..	..	..	..	2	4	2	4	pension for widow and
Lance-corporal .....	..	..	..	..	..	..	1	7	1	7	children after service for five
											years as a Warrant Officer.

¹ Obtained warrant rank in 1881; may retire after completing 21 years' service, and are compulsorily retired after attaining ages varying from 45 to 60, according to branch of Service. Not eligible for "long service" or "meritorious conduct" medals. Deferred pay ceases on promotion to warrant rank.

² 2s. 8d. to 4s. 2d.

APPENDIX. SCHEDULE B.

Table of the Rates of Pay of all Ranks of the Royal Artillery, during various Years.

Rank.	1861-62.	1867-68.	1876-77.	1881-82.	1887-88.	Rate of Pensions, 1888.
Regimental sergeant-major ¹	s. 4 d. 3½	s. 4 d. 3½	s. 4 d. 2	s. 4 d. 2	s. 4 d. 2	After qualifying service— 2s. 9d., with increase up to 9d.
Quartermaster-sergeant.....	3 9½	3 9½	3 8	3 9	3 9	do.
Colour-sergeant and troop sergeant-major.....	3 4	3 4	3 3	3 9	3 9	do.
Paymaster-sergeant.....	2 10	2 10	2 9	2 8½	2 8	do.
Regimental orderly-room clerk.....	2 10	2 10	2 9	2 8½	2 8	do.
Armourer-sergeant.....	2 10	2 10	2 9	2 8	2 8	do.
Army Hospital Corps sergeant.....	2 10	2 10	2 9	2 8	2 8	do.
Sergeant.....	2 10	2 10	2 9	2 8	2 8	do.
Corporal.....	2 2	2 2	2 1	2 6½	2 6	do.
Private.....	1 3½	1 3½	1 2½	1 2	1 2½	do.
Boys under 18 years.....	1 3½	1 3½	1 2½	0 8	0 8	do.
Trumpeter or drummer.....	1 3½	1 3½	1 2½	1 2½	1 2½	do.
Sergeant-major ¹ (<i>Warrant Officer</i>).....	..	..	..	5 10	5 10	do.
Bombardier.....	..	..	..	2 3	2 3	do.
Acting bombardier.....	..	..	..	1 11	1 11	do.

¹ Obtained warrant rank in 1881; may retire after completing 21 years' service, and are compulsorily retired after attaining ages varying from 45 to 60, according to branch of Service. Not eligible for "long service" or "meritorious conduct" medals. Deferred pay ceases on promotion to warrant rank.

² 2s. 8d. to 4s. 2d.

APPENDIX. SCHEDULE B.

Table of the Rates of Pay of all Ranks of the Infantry during various Years.

Rank.	1861-62.	1867-68.	1876-77.	1881-82.	1887-88.	Rate of Pensions, 1888.
Regimental sergeant-major ¹	s. d. 3 2	s. d. 3 4	s. d. 3 3	s. d. ..	s. d. ..	After qualifying service— 2s. 9d., with increase up to 9d.
Quartermaster-sergeant	2 8	2 8	2 7	4 0	4 0	do.
Colour-sergeant and troop sergeant-major....	2 6	2 6	2 5	3 0	3 0	2s. 6d.
Paymaster-sergeant.....	2 0	2 0	1 11	2 8 ²	2 8	do.
Regimental orderly-room clerk.....	2 0	2 0	1 11	2 8 ²	2 8	2s. 9d.
Armourer-sergeant	2 2	5 0	4 11	5 6	6 0	do.
Army Hospital Corps sergeant.....	2 2	2 2	..	..	..	do.
Sergeant.....	2 0	2 0	1 11	2 4	2 4	2s. 3d.
Corporal.....	1 4	1 4	1 3	1 8	1 8	1s. 8d., with increase up to 5d.
Private	1 0	1 0	1 0	1 0	1 0	1s. 1d.
Boys under 18 years.....	..	..	..	0 8	0 8	..
Trumpeter or drummer	1 1	1 1	1 1	1 1	1 1	1s. 1d.
Sergeant-major ¹ (<i>Warrant Officer</i>).....	..	..	..	5 0	5 0	As for cavalry.
Lance-sergeant.....	..	..	..	2 0	2 0	..
Lance-corporal.....	..	..	..	1 3	1 3	..

¹ Obtained warrant rank in 1881; may retire after completing 21 years' service, and are compulsorily retired after attaining ages varying from 45 to 60, according to branch of Service. Not eligible for "long service" or "meritorious conduct" medals. Deferred pay ceases on promotion to warrant rank.

Up to 30th September, 1873, the stoppage for rations and washing was the same as per Schedule A. From 1st October, 1873, rations were issued free, under Royal Warrant, 26th September, 1873, and the rates of pay were as stated above for the years 1876-77. *Anninities*.—Sums not exceeding 4,150*l.* for cavalry and infantry, 635*l.* for Royal Artillery, and 90*l.* for Royal Engineers, and proportionate amounts for the various departmental corps, are yearly granted to soldiers above the rank of corporal (not Warrant Officers) in sums not exceeding 20*l.*, to be held with pension. Prizes for skill at arms given annually to all branches,

APPENDIX. SCHEDULE C 1.

Daily Rates of Pay of the Corps named (1888).

Rank.	House- hold Cavalry.	Foot Guards.	Cavalry.	Infantry.	Royal Artillery.		Royal Engineers.		Present rate of Pension.
					Horse Brigade.	"Field," Garrison, and Coast.	Royal En- gineers and Tele- graph Battn.	Pontoon troop, field park, and mounted com- panies.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Quartermaster-corporal-major.....	4 6	..	..	..	..	..	..	..	2 9 ¹
Quartermaster-sergeant.....	..	4 0	4 2	4 0	..	4 2	4 6	5 3	2 9
Farrier-sergeant.....	4 3	..	4 0	..	4 5	4 3	..	4 6	2 9
Troop or battery corporal-major.....	4 0	..	3 10	..	4 4	4 2	3 9	4 4	2 6
Troop or battery rough rider.....	4 0	..	3 10	..	..	..	comp. sergt.-major.	4 0	2 6
Colour-sergeant.....	..	3 2	..	3 0	..	..	3 9	..	2 6
Corporal-instructor of fencing, gymnastics.....	3 3	..	3 3	..	gunnery-sergeant.	..	..	..	2 6
Sergeant-instructor of musketry.....	..	3 3	..	3 3	4 2	4 0	..	..	2 6
Corporal of horse.....	3 0	..	..	..	..	..	..	..	2 3
Sergeant.....	..	2 6	2 8	2 4	3 4	3 2	3 3	3 6	2 3
Corporal trumpeter (or sergeant).....	3 2	..	2 8	..	3 4	..	..	..	2 3
Sergeant drummer.....	..	2 6	..	2 4	..	3 3	sergeant bugler	..	2 3

¹ Pensions of those above the rank of corporal may be increased by service up to 9d.

Rank.	Household Cavalry.	Foot Guards.	Cavalry. Infantry.	Royal Artillery.		Royal Engineers.		Present rate of Pension.
				Horse Brigade.	"Field," Garrison, and Coast.	Royal Engineers and Telegraph Battn.	Pontoon troop, field park, and mounted companies.	
Corporal saddler (or sergeant)	s. d. 4 0	s. d. ..	s. d. ..	s. d. 3 9	s. d. 3 7	s. d. ..	s. d. ..	s. d. 2 3
Corporal farrier (or sergeant)	3 4	..	..	..	..	..	..	2 3
Corporal if paid as lance-sergeant .....	..	2	2 0	..	..	..	..	1 8 ¹
Corporal	2 8	1 9	1 8	2 8	2 6	2 6	2 6	1 8
Private if paid as lance-corporal .....	..	1 4	1 3	..	..	1 10	2 1	1 1
Kettle-drummer	2 4	..	..	..	..	..	..	1 1
Saddler	2 4½	..	..	..	..	..	..	1 1
Shoeing smith	2 3	..	..	2 2	2 0	..	..	1 1
Trumpeter or drummer	1 11	1 2	1 1	2 0	1 2½	1 1½	1 4	trumpeter 1 8 drummer
Private (or gunner)	1 9	1 1	1 0	1 4	1 2½	1 1½	1 4	1 1
Boys up to 18 years of age	0 8	0 8	0 8	0 8	0 8	0 8	0 8	1 1
Master gunner, 3rd class .....	..	..	..	..	4 6	..	..	..
Collar-maker quartermaster-sergeant .....	..	..	..	3 11	3 9	..	..	2 9
Wheeler quartermaster-sergeant .....	..	..	..	3 11	3 9	..	..	2 9
Band-sergeant .....	..	..	..	..	3 6	..	..	2 3
1st corporal of the band .....	..	..	..	..	2 9	..	..	1 8
Bombardier .....	..	..	..	2 5	2 3	..	..	1 8
Musician .....	..	..	..	..	1 5	..	..	1 8
Driver .....	..	..	..	1 3	1 2½	..	..	1 1

¹ Corporal, and below that rank, up to 5d. for further service after twenty-one years.

Daily Rates of Pay of the Corps named (1888).

TO AN ARMED FORCE.

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	Staff Clerks.						Present rate of Pension.	
	s.	d.						
Sergeant staff clerk on appointment.....	3	6					2	3
After three years, colour-sergeant	4	0					2	6
After three years in receipt of 4s., quartermaster staff clerk.....	4	6					2	9
After three years in receipt of 4s. 6d.....	5	0						
Paymaster-sergeant and orderly-room clerk	Household Cavalry.		Foot Guards.		Cavalry.		Infantry.	
	s.	d.	s.	d.	s.	d.	s.	d.
	3	0	2	6	2	8	2	8
	3	6	3	0	3	2	3	2
	4	0	3	6	3	8	3	6
	4	6	4	0	4	2	4	0
							Royal Artillery.	
Paymaster-sergeant and orderly-room clerk							2	3
On appointment—sergeant.....							2	8
Ditto, if a colour-sergeant, or after three years in receipt of 3s.							3	2
Ditto, if a quartermaster-sergeant, or three years in receipt of lower rate.....							3	6
After three years in receipt of next lower rate.....							4	0
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Deferred pay at 3*l.* per annum is given in addition to these rates of pay, to privates and corporals for 12 years, and to sergeants on completion of 21 years. This has been granted since April, 1876. Stoppages and rewards as per Schedule B.

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ESSAY.

DISCIPLINE: ITS IMPORTANCE TO AN ARMED FORCE, AND THE BEST MEANS OF MAINTAINING AND PROMOTING IT.

By Captain A. M. MURRAY, R.A.

“Force is no remedy.”

PART I.—*Introductory.*

“I am more and more convinced from the experience of this, as well as from the last campaign, that our want of success is entirely due to the want of discipline in the army.”—MARLBOROUGH.

THE first part of the title of this essay would seem to be the statement of an axiom rather than the theme for argumentative discussion. It needs, indeed, no argument to demonstrate what history conclusively proves, that military discipline and success in war go hand in hand together. There may be differences of opinion as to how the discipline of an army should be maintained; there can be no difference as to the importance of maintaining it in as high degree as possible. Whether we judge from the utterances of successful Commanders, or from the results of their campaigns, we may affirm it to be a matter of fact, established beyond all risk of contradiction, that discipline is the first and most necessary condition of success for an armed force which seeks to fight its way to victory.

The student of military history will find during the course of his reading numerous examples of the truth of this assertion. There is in the first place the great and striking example of the English Army, the records of which—especially during the past century—will be made the subject of constant reference for the purpose of this inquiry. It will be well, however, in the interests of exhaustive discussion to go further abroad than England, and even to look for examples in classical as well as modern times, so as to ascertain whether military discipline is founded upon ancient and ever-existing principles of war, or is merely the outcome of the changed conditions of modern fighting. With this object in view it will be convenient, without accumulating instances, to select one example from ancient

and one from modern history, and, with the help of such evidence as may be forthcoming, examine the conditions under which each example offers itself for instruction. Such examination will be useful, not only by way of preface to the matter under discussion, but also as affording means for ready reference when the second and more practical part of this essay comes to be considered.

In ancient times, the Persian invasion of Greece is a conspicuous and ever-instructive example of the value of discipline in war. The overthrow of Xerxes and his vast host shows what the presence of discipline can do when unattended by science, or preparation, or numerical superiority, or, indeed, by any of those conditions (except the one mentioned) which are generally supposed to contribute to belligerent power. The Greek armies were badly equipped,¹ and badly led. Hardly any preparation had been made to oppose an invasion, which, after the battle of Marathon, was known to be inevitable,² but which was awaited both in Athens and in Sparta with an apathetic calmness inexcusable even in the face of conscious strength.³ The commanders appointed to lead the armies did not understand the most elementary principles of scientific strategy. Nor did they make up by energy for want of military wisdom: they would not even take steps to ascertain the necessary topographical features of their own selected battle-fields.⁴ At Thermopylæ, at Salamis, and at Plataea, they allowed themselves to be out-generalled in such a way as actually to court defeat. Combination of action, moreover, was paralyzed by want of political union no less than by divided military counsels. The Persians, on the contrary, brought to the encounter all the resources of a rich country, and all the experience acquired by long practice in war. They were led by a man who, though a coward at heart, and with other great faults of character, was until his defeat regarded, and not without reason, as the first soldier of the day. He had laboured for seven years to organize the army of invasion, and had elaborated his plans with extraordinary pains. Considering the difficulties which must have existed in those days in the way of transport and supplies, it cannot be denied that both the plan of the invasion and the manner of its execution afford an exceedingly high testimony to the military capacity of Xerxes.⁵ Yet in spite of advantages of numbers, skill, organized plan, undivided command, and superior military knowledge, when it came to actual

¹ Except only in arms.

² Herodotus, VII, 239.

³ The Athenians were celebrating the Olympic, and the Spartans the Karnean festivals (Herodotus, VII, 206), at the very time when Xerxes had reached the Greek outposts.

⁴ Grote: "History of Greece." Part II, chap. xl.

⁵ It is not necessary to accept Herodotus's ridiculously exaggerated estimate of the numbers of the Persian army to give Xerxes the credit due to great foresight and organizing capacity, as shown in the mobilization of his army, in its successful march through the wild and unknown country of Asia Minor and Macedonia, in the engineering feat of bridging the Hellespont, and cutting the ship canal through the promontory of Athos (an authenticated fact), and in the collection of the supply depôts along the line of march.

fighting the contest was never even doubtful. Discipline asserted itself from the first, and maintained its power until the last Persian had been driven from Greek soil. "The Greeks," we are told by Herodotus,¹ "fought in order and preserved their ranks: the barbarians, without either regularity or judgment. . . . They discovered no inferiority either in strength or courage, but their inferiority with respect to discipline was conspicuous."²

Turning from ancient to modern history, many instances at once occur to the mind of well-disciplined forces, under otherwise unfavourable conditions, achieving remarkable and repeated successes against armies numerically superior and not less brave, but deficient in the essential quality of military discipline. The irruption of Gustavus Adolphus into Germany in the 17th century, the conquest³ of Mexico by Cortes, the present unhappy condition of Poland,⁴ our own struggles in India in 1857-58, and more recently in the Soudan, the wonderful victories achieved by the German armies in 1870-71, these are a few out of many examples which exist to remind us of the invincible influence which discipline exerts in war.

The first case quoted above is perhaps the most striking example of this influence. Embarking at the head of only 13,000 soldiers, the Swedish King, up to that time unnoticed, almost unheard of—the "King of Snow," as he was contemptuously termed in Vienna—without allies, or even the promise of assistance, but strong only as the champion of the Protestant faith in Europe, undertook of his own accord to invade the dominions of the Emperor of Germany. The result of the invasion is within the recollection of every student of military history. In little more than two years from the date of landing at Stettin, Gustavus had beaten the Imperial armies out of the field and established his power over the whole of the country which extends from the borders of Hungary and Silesia to the banks

¹ Book VIII, 86 :

ληματι μεν νυν και ρωμη ουκ εσσοιες ησαν οι περσαι.

² The historian Grote endorses this view of the Persian overthrow in the following corroborative words: "Their signal defeat was not owing to the want of courage, but to their want of orderly line as compared with the Greeks, and to the fact that when once fortune seemed to turn against them they had no fidelity or reciprocal attachment, and each ally was willing to sacrifice others in order to effect his own escape."

³ "Singly," writes Prescott, "and with the same weapons, the Indian might have stood his ground against the Spaniard, but the success of the latter established the superiority of discipline over mere physical courage and numbers."—"Conquest of Mexico."

⁴ Poland undoubtedly owes its present divided state to the habitual want of discipline which has ever characterized Polish armies in the field. Individually the Pole is excellent fighting material: brave, chivalrous, high-spirited, possessing military instinct in a marked manner, capable of being roused to the highest pitch of enthusiasm, he has never been able to submit to the necessary restraints which the laws of military discipline impose on battle-winning armies. "Weakened," writes Alison, "in these contests with their enemies equally by their freedom as their tyranny, knowing of liberty nothing but its licentiousness, of government but its weakness, inferior to all around them in discipline, the Poles are the only warlike nation in the world to whom victory never brought either conquest or peace."

of the Rhine, and from the Baltic Sea to the Lake Constance. He achieved his conquests, moreover, against the fiercest troops and the most renowned¹ Commanders of the day. What ultimate limit would have been placed to his victorious progress, had he not been prematurely killed at Lutzen, it is impossible to say; but it was known before his death that, after securing his position in Bavaria,² he intended to cross the Inn, and establish his power in the Imperial capital of Vienna.³

The success of this wonderful two years' campaign was principally due to the excellent discipline maintained in the Swedish army. Without this discipline⁴ the genius of Gustavus, his tactical reforms, and the superior mobility of his troops, would never have carried him through his career of continuous conquest.

"All Europe," wrote the historian⁵ of the Thirty Years' War, "was astonished at the strict discipline which at the first so creditably distinguished the Swedish army within German territory; all disorders were punished with the utmost severity, particularly impiety, theft, gambling, and duelling. The Swedish Articles of War enforced frugality. In the camp, the King's tent not excepted, neither silver nor gold was to be seen: the General's eye looked as vigilantly to the morals as to the martial bravery of his soldiers; every regiment was ordered to form round its Chaplain for morning prayers. In all these points the lawgiver was also an example. A sincere and ardent piety exalted his courage. The hardships of war he shared with the meanest soldier in the army. . . . Such a leader was followed to victory alike by the coward and the brave, and his eagle eye marked every heroic deed which his example had inspired."

Strictly but kindly enforced, willingly obeyed, and never relaxed, this⁶ discipline was the secret of Gustavus's success, for it caused the

¹ Tilly, Pappenheim, and Wallenstein.

² Gustavus never went into winter quarters.

³ "History of the Thirty Years' War," by Anton Gindely; translated by Andrew Ten Brook.

⁴ "Gustavus Adolphus was the first General who grasped these facts, and who saw that mobility must be dependent on discipline."—"Précis of Modern Tactics," by Col. Home, C.B., R.E.

⁵ Schiller.

⁶ The following interesting description of the discipline maintained in the Swedish army is from the pen of Dr. Harte, who took immense pains to collect material for his life of Gustavus Adolphus:—

"The discipline between the respective contending forces was widely different, for the Imperialists had been corrupted by long prosperity. In a word, making the single exception of courage, they were just the reverse of the Swedes. One uniform succession of conquests had rendered them audacious, avaricious, and cruel. Though they had seen and performed great things, yet they were obliged to submit to younger and less experienced men, merely because they were moral, more virtuous, and better disciplined; for the camp of Gustavus was a school of order, decency, and religion. The King lived with his soldiers and knew them all. Luxury was a stranger in his camp, and so was gaming. Their hardness of constitution was such that they could extend the duration of a campaign almost equal to that of the year, being alike patient of heat and cold. Their camp was their home, their inn, their farm, their city, and their country. One would think an army no very excellent school either of learning to read or apprehending one's duty to God; yet Gustavus, and the

people of Germany, who had long been suffering under the cruel oppression of Tilly's lawless soldiery, to welcome the Swedish troops as deliverers from the Imperial yoke. Everywhere the inhabitants received Gustavus with acclamation; recruits crowded to his standards; his small force soon swelled with deserters from the Imperialist armies, and after providing for the garrisons of the strong places which he had captured, he was enabled to place nearly 35,000 men in line at his final battle of Lutzen.

It is well to dwell on these examples which so emphatically bear witness to the necessity of discipline, as the tendency of the age is rather to minimize its value, and place it in the background behind other military qualifications. We may, however, be certain that discipline is necessary now, nay, more necessary than ever, and that, altered as the conditions of war are in many respects, they still demand the observance of a strict code of discipline, not less strict than the code of Lycurgus, or that which Gustavus Adolphus drew up for the government of Swedish soldiers. The growth of wealth and luxury, the increased opportunities for self-indulgence, the craving after liberty, the levelling spirit of the age, which is becoming more and more developed,—all these influences, which are brought to bear on soldiers as well as civilians, need to be counteracted by the firm control of disciplinary law. It is not easier to face death now than it was 2,000 years ago, and if a high state of discipline did enable the Lacedæmonians to place fear of disgrace before thought for life, so is it equally necessary now to bring men up to the enemy and give them courage to die. Courage—unreasoning, reckless courage—as we have lately learnt on high¹ authority, is only the natural gift of a few individuals; but it can be acquired in a high degree by men who are bound to one another by the sentiment of mutual attachment formed in the presence of common danger. It is discipline which trains men to this sort of courage, which nerves the timid, and strengthens the weak, which makes heroes of cowards, and stimulates all to the highest deeds of daring.

The dust of education must not be allowed to blind our eyes to the necessity of discipline. Education, we are sometimes told, has superseded the use of discipline, and an instructed soldier does not require to be restrained by the strong arm of military law. Undoubtedly the spread of education does require modifications both in military law itself, and in its method of administration; but far from superseding the use of discipline, education has only increased the necessity of its existence.

Swedish Generals after his death, paid particular attention to these points. Public schools were opened every day with the same regularity as in a country town; and the moment the forces began to intrench themselves, the children went to a safe place marked out for the school.”—“History of Gustavus Adolphus,” by Harte.

¹ “Fortnightly Review,” August, 1888. “Courage,” by General Viscount Wolseley, G.C.B. “The instinct of self-preservation comes to view at every turn. It is only the pride of regiment, of the country to which it belongs, of the traditions attached to it, and the sense of honour that springs from these sources, that can make the ordinary John Jones or William Smith so far disregard his personal safety as to face a deadly storm of bullets.”

"The spirit of criticism," to quote the words of an eloquent military¹ historian, "spreads with the growth of education, and considerably out of proportion with it. The reasoning obedience which a soldier should yield is perhaps confused with an obedience which requires to know the reason of an order, instead of that which is readily yielded in the belief that what may be unintelligible in detail is necessary for the general plan. That such obedience is not always easy to give may be true. The possession with a strong will of but pigmy power is undoubtedly trying; but the self-denial which is demanded stands among the highest of all military virtues, as it is the alphabet of all military training. He only is fit to rule who has first learnt to obey."

This is how the influence of discipline steps in, and asserts its authority. Education, in fact, may either be a source of great strength or of great weakness to an army, according to the use that is made of it. If it teaches men to think without teaching them also to obey, it can only be productive of the utmost evil. If, however, limits are placed by the necessary restrictions of discipline to its otherwise boundless range, then it becomes a great moral lever of tremendous advantage to an armed force. Education and discipline, we may say, are necessary to one another. There is no antagonism, but on the contrary, close affinity between the two, and the nearer this affinity approaches complete incorporation, the greater is the influence exerted by the combined power of both forces.

The question may here be interposed, What is military discipline? What is the meaning of the term, what are its special attributes, and its sources of strength, and upon what does it depend for the power it possesses? It will, however, be impossible to give a categorical answer to these questions, or attempt to limit the use and meaning of the word which we are discussing, by a concise definition. Discipline has been defined by one² authority as "obedience to superiors": yet

¹ "History of the Royal Artillery," by Colonel F. Duncan, C.B., M.P. The value of education as a means of preserving discipline, and which is so much insisted on in the German army, was well brought out in a work which appeared some years ago on the "Army of the North German Confederation," by a Prussian General. "The instruction," he wrote, "existing in the army is of high importance both for its moral value and the military worth which is closely connected with it. Any understanding that is not quite uncultivated must comprehend that in all institutions of human society order and submission to commands are necessary, and therefore also obedience. It must also comprehend the necessity of lawful punishment for any rebellion against order and obedience; and just because he comprehends the necessity, an educated man submits to it more willingly than an uneducated one. Education is, therefore, a useful foundation for military discipline, and nourishes a sense of honour."—"The Army of the North German Confederation," by a Prussian General. Translated by Colonel E. Newdigate.

² "Drill is a means to discipline, but drill is not discipline, which may be defined as obedience to superiors."—"Précis of Modern Tactics," by Colonel Home, C.B.

Another high authority, H.R.H. the Duke of Cambridge, once said that "Dress is discipline" (see Q. 8689, "Report of the Militia Committee of 1876"). His Royal Highness did not of course intend his words to be a complete definition of discipline, but his answer is instructive as showing how many elements there are in military discipline, and how impossible it is to exhaust the meaning of the word in a single definition.

the scope of these words hardly seems wide enough to satisfy the conditions of a complete definition. For discipline, in its application to an armed force, implies something more than mere passive obedience. Xerxes commanded the obedience of his soldiers; but he did not maintain discipline in his army. The same, as we shall presently see, may be said of the relations which existed between the Duke of Wellington and the English Army during the Peninsular War.¹ Discipline is perhaps best described by saying that it is a living principle—an active moral force deriving its power from constituted authority extending from leader to follower. What the spirit is to the body, discipline is to an armed force. It is the soul of an army. It inspires the thoughts, directs the aims, and controls the actions of every individual who comes under its laws. Discipline, as the author of the “Operations of War” has pointed out, is the union of very different qualities, each of which is an important element in war. “It means cohesion of the units, and suppleness of the mass, it means increased firmness and increased flexibility, it means the most efficient combination of many and various parts for a common end.”

Having thus far disposed of the introductory part of the subject under discussion, and having formed some conception of the importance of discipline to an armed force, the way seems clearer for passing to the second and more practical part of the inquiry, viz. : “the best means of promoting and maintaining it.”

Discipline we have seen to be an active moral force depending for its power on its ability to impress individuals, and masses which are collections of individuals. What organization is best suited for ensuring this object? This is the first question which suggests itself for answer. (Part II.)

Then again, moral force rests upon authority, and authority upon law. What are the best laws for establishing this authority, and for investing the moral force of discipline with power, strength, and respect? This is the second question to be answered. (Part III.)

Thirdly, what are the principles which should guide the conduct of

¹ It is hardly necessary to remark that no personal similitude between the Duke of Wellington and Xerxes is intended in this passage, the full signification of which will be explained further on in the essay. It would, indeed, be difficult to conceive two men differing more widely in personal character than Wellington and Xerxes. No one understood better than the great Duke in what true military discipline consists; or how painfully ignorant many of the Officers serving under him in the Peninsula were of the plain meaning of the term. Perhaps the best definition existing anywhere of discipline is to be found in a general order dated Badajoz, 24th September, 1809, an extract from which is here given:—

“The Commander of the Forces wishes the Commanding and other Officers of the regiments, particularly the field Officers, to recollect that there is a great deal to do to keep their regiments in order besides attending to the parades and drills of the men.

“The Commander of the Forces desires that Colonel Peacocke will pay attention to the state of discipline (meaning by that word habits of obedience to orders, subordination, regularity, and interior economy) of the 2nd battalion 83rd Regiment, and 2nd battalion 87th Regiment, as well as to their parade discipline and drill.”

those who are entrusted with the administration of the laws of military discipline? (Part IV.)

When answers can be found for all these questions the inquiry will be complete, and the best means of "promoting and maintaining" discipline in an armed force will have been discovered.

PART II.—*Organization.*

"An army is but an instrument, and according to the way in which you construct that instrument it will work."—The late PRINCE CONSORT.

Organization begins with the individual soldier. His treatment, training, and assigned duties should be such that he may be made the best use of when acting in combination with others. After the individual comes the first small mass or collection of individuals under an appointed leader. Two or more of these small organized masses are then combined together under the command of a superior leader. This method of collecting masses of gradually increasing strength under leaders of ascending rank is continued until the Army is built up, and a chain of responsibility stretched from the supreme Commander down to the individual soldier.

The arrangement of every armed force which pretends to be called an organized army, should be based upon this principle, viz., the gradual decentralization of authority and responsibility, from the highest leader to the lowest individual; and an examination of all the best types of armies, whether in ancient or modern times, will convince the student that perfection in discipline has been reached, or fallen short of, according as this fundamental principle of organization has been fully or incompletely adopted.

There would seem to be three leading characteristics of sound organization, which should never be lost sight of, and which are essential features of perfection. They may be stated as follows:—

(a.) *The Individuality of every Member of the Force.*—This individuality¹ should be preserved both when the soldier is acting in his individual capacity as a fighting unit, and in his corporate capacity as a portion of an organized mass. For where the observance of military discipline is concerned, the harmonious working of those laws which are necessary for its maintenance, and to which reference will presently be made, depends entirely upon the way in which each indi-

¹ On this point Lord Wolseley makes the following remarks in the "Soldier's Pocket-book": "The greater the individuality you give to the soldier himself, and to his company, and to his battalion, the more he feels that his individual conduct is of importance. No pains should be spared by Officers in impressing upon their men the consequence that attaches itself to the behaviour of each of them. Make a man proud of himself, and his corps, and he can always be depended on."

So too Frederick the Great observes: "In an army every individual part of it should aim at perfection to make it appear to be the work of only one man."—Extract from the "Military Instructions of Frederick the Great to his Generals." Translated by Major Foster.

vidual can be impressed with the necessity of obeying the laws himself, and inculcating their obedience on others.¹

(b.) *The Unity of each Mass.*—This will be found to have been a marked feature of the military systems of Lycurgus and Gustavus Adolphus, as indeed it also was of the Roman military organization, of that established in the French Army² by Napoleon, and of the German system³ when it had been brought to perfection after the war of 1866. This unity should be preserved intact down to the lowest organized mass of individuals, and no attempt should be made to assign a conventional limit to its extension.⁴ The controversy over the size and constitution of “units,” which was at one time carried on with so much vigour, has at length been settled in this sense, and the necessity is now recognized of preserving the identity not merely of the Division, the brigade, and the battalion, but of the company, the half-company, and the section. There can be no doubt that the principle⁵

¹ This principle was fully recognized and admirably brought out by the author of the Wellington Prize Essay in words which are well worth reproducing in support of the text of this essay.

“For an army,” wrote Colonel Maurice, “that would be able to meet all the circumstances of present warfare with the same freedom with which the Prussian has met them, the first great necessity is that the free action of every rank, from the General to the private, should be fully developed—not in order that each rank may interfere with and claim independence from the rank above it; but in order that each may more effectually co-operate with and carry out the work assigned by that immediately superior to it.”

² “Each Corps was formed into four or five Divisions, varying in strength from 5,000 to 7,000 men, commanded by Generals of Division, who received their orders from the General of the Corps. The troops in these Divisions always remained under the same Officers; the Divisions always belonged to the same Corps; no incorporation or transposition, excepting in cases of absolute necessity arising from extraordinary casualties in war, disturbed the order established in the camps. In this way the Generals came to know their Officers, the Officers their soldiers; the capacity, disposition, and qualities of each were understood. An *esprit de corps* was formed not only among the members of the same regiment, but among those of the same Division and Corps.”—Alison, “History of Europe,” chap. xxxi.

³ “Every man seems to be in his place, and to know his proper business. The finished intelligence of large reach and measure, which presides over the whole strategic operations of Von Moltke, is proportionally represented in every military organism, from the *corps d’armée* to the company. Miscarriage or mistake seems no more to adhere to their ordinary operations than to the working of the machinery of a cotton factory. But, when any of these masses are resolved into their parts, the units, too, of which they are formed have each had their separate training, and each is capable of acting alone in his own sphere.”—“Edinburgh Review,” October, 1870. “Germany, France, and England.”

⁴ To again quote the author of the “Wellington Prize Essay”: “What we really require is that each body shall be so perfectly built into every other that at each successive stage of the building a perfect unit shall be formed. A brick is not less complete because it is arranged in a course, or a course less regular because it is built into a wall; nor does a wall less perform the special part assigned to it because it forms one of the sides of a house.”

⁵ In the English “Infantry Field Exercises” this principle is in theory extended as low down as the section of fours, which is composed of a right and left file of the company:—

“The four men composing a right and left file will be considered as comrades in the field, and will act together, not only in forming fours, but on other occasions; they should therefore take notice of one another when they are told off.”—“Infantry Field Exercise,” 1884.

is one of the utmost value in regard to the maintenance of discipline, for if the permanent identity of each organized mass is constantly disturbed,¹ it must be to the detriment of its unity, cohesion, and *esprit de corps*, the "union" of which qualities, as we have already seen, constitute what we understand by the word "discipline."

(c.) *The Responsibility of each Leader.*—This requires to be scrupulously maintained from highest to lowest. Regard for it ensures obedience; disregard cannot fail to lessen authority. "It is perfectly clear that to establish and maintain discipline there must be personal contact between the superior and inferior."² Military organization then should seek to draw leaders and followers together, and render this contact as close as possible. This can only be done by rigid observance of the chain of responsibility.³ No leader should ever be passed over by a superior, either in the communication of his own orders, or in transmitting instructions which he may have received from higher authority. As each individual should be taught to look to his immediate leader for action and counsel, so if he receives instructions from any superior or otherwise extraneous source, the influence of the leader is diminished, and the interests of discipline are proportionally injured.

The altered conditions of modern battles more than ever demand the decentralization of responsible leadership. The functions of executive command have indeed passed out of the hands of superior officers into those of subordinate leaders. At the most critical moments of modern battles the smallest group leaders have greater influence in determining the result of the fight than the Commander-in-Chief himself can possibly hope to exert. The maintenance of discipline will be in their hands, and must remain there till death or victory relieves them of its burden. The truth of this was long ago recognized by the Germans at the time when the late Prince Frederick Charles of Prussia addressed his famous "Military Memorial" to the regimental Officers of the Army.⁴ If it has only met with tardy

¹ Sir Frederick Roberts brought this point out very clearly in his famous Mansion House Speech on the 14th February, 1881, when he was urging the importance of not transferring soldiers from corps to corps without strong necessity:—

"When once they have been posted, if that spirit of loyalty to their own corps is to be maintained, a spirit which every soldier knows often prompts men to do so much more than their duty, they should not be removed from their regiment, except by their own choice, or at the most pressing demands of the Service."—"Times," 15th February, 1881.

² "A Précis of Modern Tactics," by Colonel Home, C.B., R.E.

³ It is impossible to exaggerate the importance of maintaining this chain of responsibility intact down to the individual soldier. However great the temporary temptation may be to break through the chain, or however apparently convenient it may seem to do so, the sin of giving way is certain to find itself out. No more fruitful source of insubordination exists than neglect of this great vital principle of military organization. It is impossible to talk for five minutes to any intelligent recruit without feeling that this is so. He likes the Army, he will tell you, he is fond of military life, and finds his duties pleasant and agreeable. He has only one complaint, and that is, that he has "so many masters," whereas in civil life he only had one. It should be the aim of organization to give him this one master.

⁴ Since these words were written their truth has received fresh confirmation in the newly issued German Drill Regulations. "The most important requirements of

belief in England, this is not because we are unwilling to learn, but because the necessity of believing it has never been brought home to English troops on a modern European field of battle. There are, however, signs¹ that the principle of decentralized leadership is at length becoming recognized in the English Army as a necessary development of the new conditions of fighting, and we may safely affirm that the more practical the shape this recognition assumes during peace training, the surer is the guarantee that discipline will be maintained in war.

The three essential characteristics of good military organization, as set forth above, will be found to have existed in the case of both those armies which have been selected for reference in this essay as models of sound discipline.

Turning first to the case of Sparta, we find the smallest recognized mass of individuals in the Spartan Army was the *enomotia*, consisting of 25, 32, or at most 36 men. Each *enomotia* had a separate captain or *enomotarch*, the strongest and best man in the company. He was always in the front rank, and led the *enomotia* when it marched in single file. Above the *enomotia* were larger masses of gradually increasing strength, the *pentecostæ*, the *lochi*, and the *moræ*. The Commander-in-Chief transmitted his orders through the *polemarchs*, who commanded the *moræ*, to the *locharchs*, from the *locharchs* to the *pentecostarchs*, and from the latter to the *enomotarchs*.²

The *enomotia* was the foundation of the Spartan organization.³

war," so runs the official preface to the Regulations, "consist in the maintenance of the strictest discipline and order, even when all the faculties are at their highest tension." It is then described how this discipline can alone be secured by the decentralization of responsibility down to the lowest individual. In commenting on these new Regulations with special reference to the English Army, Dr. Russell, who has been an eye-witness of nearly all recent European campaigns, makes the following pertinent remarks in his journal: "While we in England are jealously guarding the rights of superiors, and never descend below the Colonel and his Adjutant, the Germans not only emphasize their old custom of allowing every opportunity to the commander of each unit, but go a step further, and extend their confidence to each individual man composing those units."—"Army and Navy Gazette," 20th October, 1888.

¹ The demand for the abolition of special instructors, and for placing the instruction of recruits entirely in the hands of company Officers and non-commissioned officers, is one of the "signs" of the awakening alluded to above.

"The days of special instruction," wrote Lord Wolseley, now more than ten years ago, "for the education of recruits are numbered, and company and troop Officers must learn to teach their own men to drill, to shoot, and to ride, without the assistance of musketry and gunnery instructors, or of riding-masters."—"Nineteenth Century," March, 1878.

Without entering into the controversial part of the question, it seems clear that the interference of specialists, whether necessary or not, does contribute to divide responsibility, and, in so far as it does so, to weaken the bond of "contact" between leader and follower, or, in other words, to weaken discipline.

² So far as can be ascertained, there were four *enomotia* in each *pentecosta*, and four *pentecostæ* in each *lochos*. According to Xenophon, the *mora* consisted of four *lochi*. Xenophon and Thucydides differ slightly as to the composition of the Spartan Army, but both agree upon the principle of the triple organization as set forth in the text of the essay.

³ "It was upon these small companies that the constant and severe Lacedæmonian

The men in each of these small companies were drilled together, and bound to one another and to their leader by a common oath. The "individuality" of each member of the enomotia was strongly emphasized, and to such an extent was this carried that a Spartan soldier named Pantites, who was absent on civil business from Thermopylæ, where his enomotia was engaged, put an end to his life when he heard that his comrades had fallen.¹ Aristodemus, who was the only one of the 300 who escaped the disaster by flight, was loaded with disgrace. No one would speak to him, or offer him fire; he was branded, his face shaven, and the opprobrious term of "trembler" (*τρεσας*) was annexed to his name.² Nor, though he afterwards fell honourably at Platæa, was death allowed to wipe out the lasting infamy of his cowardice, and he was refused the usual burial rites accorded to those who were killed in battle. By such lessons as these was the necessity of discipline brought home to Spartan soldiers, who were taught to believe that the safety and honour of their country depended, not upon the skill of their Generals, nor the numbers of their troops, but on the personal exertions and individual discipline of each member of the State Army.³

It was the perfection of her military organization, and the admirable state of discipline maintained through its machinery, that marked Sparta out for leadership among the Greek States, as early as the first Persian invasion under Darius. The manner in which she was then appealed⁴ to for help and counsel at a time of imminent

discipline was brought to act; they were taught to march in concert, to change rapidly from line to file, to wheel right or left, in such a manner that the enomotarch should always be immediately opposed to the enemy."—Grote's "History of Greece," vol. ii.

¹ Herodotus, Book VII, chap. cexxx.

² *Ibid.*

³ The Macedonian phalanx, and afterwards the Roman legion, were constructed on the same broad principles of organization as those followed by Lyeurgus. Both were built up from small units. The "lochus," with its single file of 16 deep, was the foundation of the phalanx. 16 "lochi" constituted one "syntagma," 256 strong; and two "syntagmas" formed one "pentakosiarchy," 512 strong. This was the ordinary regiment. Among other changes which Alexander made in the constitution of the phalanx, he put four "syntagmas" to one "pentakosiarchy," and two or more of these regiments he grouped into a "taxis," under a superior leader.

In a similar way the "century" was the foundation of the Roman legion. Two centuries—each at first 100 strong, but afterwards decreased to 60 strong when the tribes were increased in number—formed one "maniple," four maniples one "cohort," and ten cohorts one "legion."

It is not intended to discuss the constitution of the phalanx and legion at further length, but merely to point out that the high state of discipline, for which the armies both of Alexander and Cæsar were renowned, was maintained by applying to their organization precisely the same principles of decentralization and gradually descending authority which were such essential characteristics of the military system of Lyeurgus.

⁴ "Grote," part ii, chap. xxxvi.—The fact that the Spartan Army came too late for the battle of Marathon, which was won by the brilliant generalship of Miltiades with Athenian troops alone, does not alter the nature of the appeal made to Sparta by Athens, or do away with the fact that her aid was considered indispensable to resist the invasion.

national danger is a tribute to the military ascendancy which she had insensibly gained over the other Greek communities. What, however, for the purpose of this essay it is specially important to note in this connection is that this ascendancy, which came to Sparta from the first naturally and without seeking on her part, and which she maintained after a long and bitter struggle with her brilliant rival, was acquired in spite of many disadvantages—such as she owed for instance to her inferior geographical position, and to the prejudices and dull intellect¹ of her people—was due to the sheer force of a high standard of discipline maintained in her army by means of a sound system of organization.²

It is time now to turn once more from ancient to modern history. After the decline of the Roman Empire military organization fell into neglect. Wars ceased to be conducted on scientific lines, and degenerated into mere contests of brute strength. Large masses of horse and foot soldiers were collected together, as best they could be, considering the want of system and consequent want of discipline. It was not till the early part of the seventeenth century that Gustavus Adolphus appeared, and once more raised war to the dignity of a science. He began by making a complete revolution in the organization of the Swedish army as he received it over from his father king.³ He broke the huge unwieldy columns, which then existed, into small self-supporting "pelotons," varying in size from 96 to 214 men. Giving each peloton a separate leader, and reducing the depth of the columns to six men—the Imperialist columns were eighteen deep—he arranged these small pelotons or companies in "battaglia," half brigades, and brigades; while, instead of placing all his troops in one line, he supported his first line with a second line of reserves in rear. Here, after an interlude of 1,500 years, we find Gustavus reorganizing his troops on the same principle which, as has already been seen, governed the organization of the Spartan armies, and which had been extended with so much effect to the Macedonian phalanx and the

¹ Grote speaks of the "selfish dulness" of the Spartans. Part ii, chap. xxxvi.

² "The military forces of the other cities of Greece, even down to the close of the Peloponnesian War, enjoyed little or no special training, having neither any small company like the *enomoty*, consisting of particular men drilled together, nor fixed and disciplined officers, nor triple scale of subordination and subdivision."—Grote's "History of Greece," part ii, chap. viii.

³ The following description of Gustavus's organization, although from the pen of a civilian, gives such an admirable idea of the changes introduced by the Swedish king that it is well worth reproducing:—

"Thus the whole army was one complicated but unperplexed machine, consisting of innumerable parties or pelotons of men, all little systems by themselves, all acting under a chieftain of their own, yet all contributing to the grand establishment of the whole together. By these means, and by the power of moving easily from place to place, he brought more hands to act than the enemy could; and, though his men might be killed, they could not be routed, for help was ever at hand, and the destruction of one part did not necessarily involve the destruction of another. The directions of the General had always free passage, as the blood is poured from the heart, and then regularly dispersed not only through arteries and veins, but even through the smallest capillaries."—"History of Gustavus Adolphus," by Harte, vol. ii, p. 23.

Roman legion.¹ It was with an army thus organized that Gustavus routed the huge solid columns of the Imperialists at Leipzig and Lutzen; and when the high state of discipline which prevailed among the Swedish troops is given, and rightly given, as the cause of their surprising victories, it is again necessary to remember that discipline without organization is only an empty title, and that the famous Swedish code compiled by Gustavus himself would have remained a dead letter incapable of practical application had he not so organized his troops that both the letter of his laws and the spirit of his own example might descend from the soldier-king to the humblest follower in his army.

No one understood better than the Duke of Wellington what an important bearing organization has on the discipline of an armed force, and when, in 1829, the Government of the day proposed to abolish corporal punishment, and adapt the stern system of repressive discipline which existed in the English army to the milder method of treatment which had been tried with so much effect in the Prussian Service, the Duke replied that it would be useless to alter the discipline without altering the organization also.

"The army of Prussia," said his Grace, "is at all times regularly organized, each battalion in its regiment, each regiment in its brigade, each brigade in its Division, each Division in its Corps d'Armée—the whole under the personal inspection of the King; so that there is not a Corps, Division, brigade, regiment, battalion, company, or individual whose conduct is not checked and controlled by his superior as well as by the view and knowledge of the whole of the profession. Compare this state of things with the British Army, with our total want of inspection and control over either Officers or men, in nearly all parts of the world, and we shall see cause for astonishment that there is any discipline in the Army at all I recommend that we should stand firm upon the establishment of our discipline as it is."²

The Government adopted the advice of their military adviser, and did "stand firm," until an improved organization which began to be extended to the Army in 1871 enabled the discipline to be gradually relaxed in severity with corresponding increase in efficiency.³

The ghastly testimony of the Crimean War may be finally cited as an illustration of the connection which exists between *morale* and organization. If in the month of August, 1855, the English Army

¹ "For the first time since the decline of the Roman legion an organized and well-disciplined army appeared in Europe."—"Life of Wallenstein," by Colonel Mitchell.

The military student is indebted to Lord Reay, who was in the King of Sweden's service, for an exact plan, showing the composition of one of Gustavus's brigades. The diagram gives the position of every Officer and soldier, and shows how each peloton is itself capable of subdivision into numerous sections under allotted leaders.

² "Memorandum on the Proposed Plan for Altering the Discipline of the Army," 22nd April, 1829, by Field-Marshal the Duke of Wellington, K.G.

³ Authority for this statement will be given in Part III of this essay.

was, as an eminent authority has asserted,¹ "in a discreditable degree of demoralization," this is only what must be expected by any nation which hurries into war without previous organization during peace. How lamentably defective that organization was when the Russian War burst on the country may be learnt from the Memorandum² on the Army which the Prince Consort drew up in 1855, and which has since been supplemented by Mr. Kinglake's caustic indictment of the "War Administration of England" in the sixth volume of his gorgeous narrative.³ Happily the lessons of the war have not been thrown away, and it is some consolation to feel that the sufferings of our troops in the terrible winter of 1854 awakened the English people to a sense of forgotten duty, and have resulted in a reorganization of the Army on lines of improvement which is being steadily maintained during these long years of continuous peace.

PART III.—*Law.*

"The law, which is the perfection of reason."—COKE.

"It is an intermixture of mercy and justice that will bring you fear and obedience : for too much rigour makes people desperate."—BACON.

Discipline rests, as we have seen, on authority, and authority on law. Ordinary civil law takes no cognizance of military rank, and, in order to secure discipline, it has to be supplemented by military law, which determines the functions, status, and rights of every one in the force. There are, moreover, certain offences, such, for instance, as desertion and disobedience, which, when committed by a soldier, are crimes, but when committed by a civilian are at worst only breaches of contract. Military law defines these offences, and fixes the penalties for their commission.

It is very necessary in the interests of discipline that military law should have the same status as civil law, and should, in fact, be "part of the law of the land relating to the government of the military forces, and having for its object military discipline."⁴ It is thus impressed on the soldier that while he is in the military service of his country his military character is merely "superinduced"⁵ on his civil character, and does not obliterate it.⁶ This is the view which now generally prevails with civilized nations, and especially in the case of those countries which have risen to pre-eminence in war we

¹ "The Soldier's Pocket-book," by General Viscount Wolseley, G.C.B., p. 6 of 5th edition.

² Memorandum dated Windsor, 14th January, 1855.

"I hazard the opinion," wrote Prince Albert, "that our army, as at present organized, can hardly be called an army at all."

³ Kinglake's "Crimean War," chap. iii, vol. vi.

⁴ "Treatise on Military Law," by Lieutenant Rollin. A. Ives, U.S.A.

⁵ "Manual of Military Law," War Office, 1887, chap. i.

⁶ It was well said by Mr. Clode, in alluding to the English Military Code of 1872, that "Arbitrary in its provisions and severe in its punishments, such a code, far beyond any other, needs both the sanction of experience and the weight of high authority to command loyal acceptance."—"Military and Martial Law," by C. M. Clode, Barrister-at-Law.

find their military codes, instead of deriving their authority from the prerogative powers of the Crown or Commander-in-Chief, form part of the statute law of the land. In our own Army military law remained till 1879 in the unsatisfactory position of being outside of and divorced from the civil law of England. "No permanent statute law now exists," wrote an eminent authority¹ on military jurisprudence in 1872, "the jurisdiction exercised by the military tribunals has been advisedly withdrawn from public observation. Raised as the Army originally was under an influence supposed to be antagonistic to freedom, the people have willingly remained ignorant of the peculiar laws and institutions under which both Officers and soldiers were governed."²

In 1879 Parliament took up the question, and the Army Discipline and Regulation Act of that year, re-enacted with some amendments in the Army Act of 1881, consolidated³ in one statute the provisions of the Mutiny Act and Articles of War, under which the Army had up to that time been governed. Military law in this country has now the full force and dignity of statute law, and all jealousy of the military courts has been removed, inasmuch as they derive their powers from the same source as the ordinary civil courts of the country.

The passing of this Act is an important landmark in the military history of England. From that date the English Army ceased to be an "exotic"—a caste apart from the nation, viewed with suspicion by the civil authorities, and containing in its constitution elements which were "antagonistic to freedom." It became instead a great national institution closely identified with the national life, and subject, like any other English institution, to the constitutionally exercised control of the Crown. What a portion of the Army—the Militia force—was formerly called, the whole Army may now be truthfully named—a "constitutional" force. Military obedience has been placed on precisely the same footing as civil obedience, the importance of which change in the interests of loyal discipline can hardly be exaggerated, and has a most distinct and direct bearing on the subject of this essay.

Precision, clearness, and completeness would seem to be the chief characteristics of a good military code. Offences should be distinctly specified, and penalties proportionally fixed. The powers of courts, and of executive Officers charged with administering the law, require

¹ "Military and Martial Law," by C. M. Clode, Barrister-at-Law.

² "The British Army is an exotic in England, unknown to the old constitution of the country; required or supposed to be required only for the defence of its foreign possessions; disliked by the inhabitants, particularly by the higher orders, some of whom never allow one of their family to serve in it."—"Memorandum on the Discipline of the Army," April 22, 1829, by Field-Marshal the Duke of Wellington, K.G.

³ "Thus has been accomplished, after the lapse of more than a century, a wish expressed by Mr. Justice Blackstone in his Commentaries, 'that it might be thought worthy the wisdom of Parliament to ascertain the limits of military subjection, and to enact express articles for the government of the Army.'"—"Manual of Military Law," War Office, 1887.

to be defined beyond any possibility of misconception. It is above all important in defining the summary penal powers of Officers to leave as little room for the exercise of individual personal discretion as is compatible with the necessity of fixing a maximum and minimum penalty for certain offences. It should be the aim of military law to impress all ranks with a sense of the equal justice¹ of a code to which all are amenable, and the provisions of which can be enforced against any Officer who abuses the powers conferred on him by law.

The delegation of summary penal powers is specially a matter for careful determination, and is one as to which there is considerable difference of practice among European armies. In certain countries summary powers of punishment are not conferred on Officers below the rank of company commander. This is the case with the armies of Austria-Hungary, Germany, Holland, Belgium, and Servia.² In the armies of Portugal and Greece all commissioned Officers are vested with certain penal powers corresponding to their rank.³ In the case of Russia, France, Italy, Turkey, Finland, Switzerland, and Roumania, not only do all Officers possess these powers, but even non-commissioned officers, down as low as the rank of corporal, are considered competent to inflict summary punishment.⁴ In defence of this system it is urged that everyone who is charged with maintenance of discipline requires to be vested with power to enforce obedience. It would seem, however, necessary for the just administration of military law, as it is for that of civil law, that penal power should be associated with judicial responsibility, and that if this responsibility be removed there is no safeguard against the abuse of authority. It is contrary to the accepted principles of jurisprudence to intermingle police and judicial duties, and if executive (not commanding) Officers possess proper police powers these should be sufficient to secure their authority without the addition of judicial power also. This principle⁵ is recognized in the English military

¹ "Justice ought to bear rule everywhere, and especially in armies; it is the only means to settle order there, and there it ought to be executed with as much exactness as in the best governed cities of the kingdom, if it be intended that the soldiers should be kept in their duty and obedience."—"The Art of War," by Louis de Gaya in 1678.

² "Military Law, with a chapter on the Military Law of Foreign States," by Lieut.-Colonel Tovey.

³ *Ibid.*

⁴ *Ibid.*

⁵ It was not, however, till 1879 that this principle was thoroughly recognized, when the vexed question of the duties and position of Provost-Marshals, which gave so much concern to the Duke of Wellington during the Peninsular War (vol. iv, "Gurwood Despatches," p. 311, and vol. vi, *ibid.*, pp. 517, 518), was settled by the introduction of a clause, now clause 74 of the Army Act, 1881, which restricts the duties of a Provost-Marshal to those of a police officer. He is thus deprived of the power to inflict summary punishment conferred on him by General Order of 1st November, 1811—a power which was afterwards confirmed in the 164th Article of War, by Lord Hardinge when Commander-in-Chief. This change, though apparently trifling, is in reality one of the utmost importance, both in respect of the theoretical principle of law involved, and also of the practical bearing which it must have on the future discipline of English troops in the field.

code, and while certain penal powers of minor severity are conferred on company and troop Commanders under proper restrictions and safeguards, and are not allowed to be delegated below these Officers, the exercise of full disciplinary power is confined to Commanding Officers of corps. There is thus ample guarantee against the hasty infliction of punishment on insufficient evidence, while the deliberate¹ procedure which English military law requires, strengthens the exemplary effect of the punishment awarded.

Punishment for military crime should be appropriate to the peculiar nature of the offence. The end of military discipline being to infuse a high standard of honour in an army, degrading punishments ought to have no place in a code of military law. The "custom of war" recognizes this by requiring the extreme penalty of death to be inflicted by shooting instead of by the ignominious means of hanging. For the same reason the punishment of flogging is now generally condemned on the ground that its infliction degrades the soldier, who is employed in an honourable calling. Corporal punishment did not exist in the code of Lycurgus, and though it appeared as a penalty in the regulations drawn up by Gustavus Adolphus, it was rarely if ever enforced.²

Among the armies of European States it has been retained only by those of Russia and Turkey.³ It was preserved in the English Articles⁴ of War till the passing of the Army Discipline and Regulation Act

¹ The procedure in the American Army is more deliberate than in that of any other country, the military code not conferring any summary penal powers on individual Officers, and requiring all offenders to be arraigned, even for trifling crimes, before a regimental court-martial, consisting of three members. In time of war, however, a field Officer may be detailed from each regiment to try offences committed in the field, and this Officer's court has the same jurisdiction in war as regimental and garrison courts have during peace.—"American Articles of War."

² "It was a principle with Gustavus Adolphus that even a common soldier shall rarely, if ever, receive corporal punishment; for he was fully persuaded that such a disgrace cast a damp afterwards upon his vivacity, and agreed not well with the notions which a high spirit ought to entertain of honour. It was his idea that a man of bravery would sooner forgive a sentence of death inflicted upon him by court-martial than pass by the scandal of corporal chastisement. His rule, therefore, was to degrade or banish."—"History of Gustavus Adolphus," by Harte.

³ In some codes corporal punishment is expressly forbidden, in others no mention of it is made at all. In abolishing it in 1830 the Provisional Government of Belgium described it as "insulting to Belgian soldiers, and a crime against the dignity of man."

⁴ The question was very fully enquired into by the Royal Commission of 1836, which thus summed up the evidence of a large number of Officers, non-commissioned officers, and privates, who had recorded their opinion against the retention of the lash :—

"It is said to be inefficient for its object, to degrade the character, and tend rather to harden than reform the individual. Its effect upon those who witness it is said to be that of disgust and sympathy for the offender. It is said to fail before the enemy. It is also said to be so contrary to the feelings of the country in its present state of civilization, that the public mind is irritated against it, and that circumstance alone calls for its abolition."

In spite of much strong evidence, however, against its retention, the Royal Commissioners were unable to resist the Duke of Wellington's powerful appeal not to abolish it.

of 1879, when its infliction in a modified form was only sanctioned on active service. In 1881 corporal punishment disappeared altogether from the English military code, although the civil criminal law permits its use under certain circumstances. The manner of its abolition was much criticized at the time, and was attributed in some quarters to false sentiment; but the resolution, which an eminent statesman¹ moved in the House of Commons, to the effect "that no Bill for the discipline and regulation of the Army will be satisfactory to this House which provides for the permanent retention of corporal punishment for military offences," embodied a principle which the public sense of the country recognized as sound, and in accordance with the best ideas of military jurisprudence.²

Flogging of English soldiers had in fact long stood condemned alike by its practical inefficiency as a punishment as by its degrading influence on the minds of the men. Based as corporal punishment is upon physical fear, it appealed to the very feeling to which, as Napier has somewhere remarked, English soldiers are most insensible. Flogging was for this reason powerless to deter from crime.³ But worse than this; so long as the punishment was sanctioned by English military law, it was a standing testimony to the distrust of soldiers by their own Officers, and destroyed the feeling of mutual confidence, which is—we have the word of the Duke of Wellington⁴ for it—the foundation of Military Discipline. Until the code was cleared of this blot, it was impossible to establish those relations of intimate comradeship which now mark the intercourse between commissioned Officers and the rank and file of the Army, and which, as will be shown in Part IV of this essay, are a far surer guarantee than the fear of the lash for the future discipline of English soldiers in the field. The greatest enemy this country ever had has something to teach England in regard to the treatment of her soldiers.

¹ The Marquis of Hartington.

² The question was very much complicated at the time by party feeling, and the resolution was lost by a majority of 106 in a House of 472 ("Times" newspaper, 18th July, 1879); but, after the discussion which took place, it was felt that corporal punishment was doomed. The following sweeping assertion, however, made in an influential magazine by Mr. Archibald Forbes, was allowed to pass unchallenged: "What I aver broadly is that the suffrage of the ranks would be given in favour of corporal punishment, and that too on very sound, manly, and intelligible grounds."

. . . It would be impossible to make war if recourse to corporal punishment was forbidden; and in making this assertion I am perfectly confident I have with me the Army, from the Commander-in-Chief down to the drummer-boy."—"Nineteenth Century," October, 1879; "Flogging in the Army," by Archibald Forbes.

It is hardly worth while now to enquire upon what evidence this "confident" assertion was made at the time, as the question has passed from the region of controversy to that of settled conviction. Mr. Forbes's statement, however, is in direct variance with the evidence of numerous Officers, non-commissioned officers, and privates who were examined before the Royal Commission of 1836; and public opinion is hardly likely to have changed for the worse between 1836 and 1879. It is a sufficient answer to Mr. Forbes to say that it has been found possible to "make war" without corporal punishment, and to secure a far higher state of discipline than was the case when "the fear of the lash was the beginning of wisdom."

³ Napier's "History of the Peninsular War" is a testimony to this.

⁴ Despatch to Marshal Beresford, Badajoz, 8th September, 1809.

"The English soldier," said Napoleon, "is brave; nobody more so. I think that if I were at the head of a number of them I could make them do anything. I would alter your system. Instead of the lash I would lead them by the stimulus of honour. Whatever debases a man cannot be serviceable. None but the dregs of the *canaille* voluntarily enter as soldiers. This disgraceful punishment is the cause of it. What honour can a man possibly have who is flogged before his comrades?"¹

A very high idea of the dignity of the military profession is inculcated in the Articles of War of the American Army. Not only are corporal punishments, such as branding and flogging, positively forbidden,² but confinement in a penitential prison cannot be awarded unless the offence is also one under the common law of the United States.³ The crime of desertion is associated with a peculiar degree of dishonour, and by the civil statute⁴ law a soldier, who has been convicted and punished for deserting, forfeits all rights of citizenship, and is for ever afterwards incapable of holding any office of trust or profit under the United States. It is also worthy of notice, as an instance of the spirit which pervades the American Articles of War, that the award of extra guard duty as a punishment is prohibited;⁵ and when, during the Civil War, a soldier was sentenced to perform a certain number of extra guards, the Secretary of War refused to confirm the sentence of the court-martial, and in a general order to the Army called the attention of Officers to the "danger of associating with the honourable and important duty of guards any idea of punishment or degradation."⁶

¹ "Napoleon in Exile," by O'Meara.

When it is asked what is to be done with the "*canaille*," the answer is that there is no place for such people in the reformed Army of England. The following evidence of a private in the Guards, who was examined before the Royal Commission of 1836, may be quoted as showing the feeling of the rank and file of the Army at that time in regard to corporal punishment. Much other similar evidence was recorded:—

Q. (1179).—Do you say that flogging is degrading to the man himself?

A.—Very much so.

Q. (1184).—Supposing the power of inflicting punishment at the halberds were done away with do you think it would make it easier to obtain recruits?

A.—I think it would.

Q. (1186).—When an immediate example is necessary—as a man's refusing in the face of the regiment—what is your opinion of the punishment of such a man for the sake of example?

A.—I would imprison him. If that had no effect I would discharge him from the regiment. Such a man is not fit to be there.

² Article 38.

³ Article 97.

⁴ Revised Statutes, 1998.

⁵ Military Law (U.S.A.), by Ives, chap. xii, p. 173.

⁶ *Ibid.*, chap. XII, page 173.

So also when a court-martial sentenced a soldier for absence without leave to a year's prolongation of his service, the sentence was quashed by the War Minister on the ground of its impropriety. "The military service of the United States," to quote the words of the general order, "has always been considered honourable. It does not, therefore, comport with the honour, dignity, or security of the Service to

In fixing scales of punishment for military offences it should be borne in mind that the object of punishment is to deter¹ others rather than to reform the individual punished. "I consider all punishments," wrote² the Duke of Wellington in 1813, "to be for the sake of example, and the punishment of military men in particular is expedient only in cases where the prevalence of any crime, or the evils resulting from it, are likely to be injurious to the public interests." Prompt, certain, regular,³ and exemplary⁴ punishment secures the object in view better than the infliction of lengthened and severe penalties. Publicity⁵ is an important fact to be considered in regard to the exemplary effect exercised; and was invariably insisted on by the Duke of Wellington during his campaigns. The shame of public punishment, even when short and light, brings home to all concerned the certain consequences of crime. The idea is much countenanced in the German Army, and when an Officer or soldier is reprimanded, the publication of the censure in garrison orders is frequently resorted to, and has been found to have powerful effect in promoting that high condition of discipline which characterizes German troops both during peace and war.

That severity is not necessary to deter from crime may be seen from the remarkable diminution in punishment in the English Army which occurred in 1887, at the beginning of which year new disciplinary instructions were issued by His Royal Highness the Commander-in-Chief, directing courts-martial to reduce the severity of their sentences, while at the same time the summary powers of Commanding Officers were enlarged. Commenting on this fact, the "Times" newspaper wrote as follows on the 18th October last:—

use it as a punishment for an offender. Such use will go far to destroy the *esprit de corps* which is so essential to the efficiency of an army."—*Ibid*.

¹ "The object of the penal element is more to deter others than for the effect on the individual subjected to punishment."—"Punishment and Prevention of Crime," by Colonel Sir E. F. Du Cane, K.C.B., Surveyor-General of Prisons.

² Letter to Major-General Lambert, dated St. Jean de Luz, 28th November, 1813.

³ "According to this mode of procedure the trial and punishment of an offender will not be quite so quick as we might wish, but it will be certain and regular."—Extract of a letter of Sir Arthur Wellesley to Colonel Murray, dated Bombay, 1st April, 1804.

⁴ "The repression of crime by corrective discipline depends mainly on the punishment operating widely as an example."—"Aide-Mémoire to the Military Sciences," part i, vol. iii.

⁵ G.O., dated Cartaxo, 4th March, 1811.

"As the object in assembling the troops in any station to witness a punishment is to deter others from the commission of the crime for which the criminal is about to suffer, the Commander of the Forces requests that upon every occasion on which the troops are assembled for this purpose, the order may be distinctly read and explained to them, and that every man may understand the reason for which the punishment is inflicted."

Public punishment of this nature, deliberately inflicted for the sake of example, after due consideration and hearing of evidence, is not to be confounded with the hasty, intemperate reproof of juniors by seniors in the presence of others. The maintenance of discipline specially requires this to be guarded against, and in the case of the English Army resort to this method of rebuking juniors constitutes a breach of regulations.—"Queen's Regulations," para. iv, s. vi.

"The substitution of comparative leniency for severity has in the first year diminished more serious crimes by about 15, and more venial irregularities by about 10 per cent. That these figures constitute honest evidence may be deduced from the fact that they apply, though in varying proportions, to every arm of the Service, to almost every place in which a portion of the Army is quartered, and with rare exceptions to every regiment. They are, we may assume, not affected by incidental, local, or special considerations, and they tell us plainly that throughout the Army a considerable diminution of severity has been at once followed by a considerable diminution of crime. We are beginning," the writer goes on to say, "to learn that long terms of imprisonment have a demoralizing rather than a deterring influence, and that we can have the Army better behaved without them. Not improbably if the enlightened general orders of 1887 in the direction of leniency were to be further extended the result might be still better."

Military degradation and summary dismissal have been found to act as powerful deterrents from crime in those armies in which a high spirit of honour and discipline have been encouraged. Dismissal was Cæsar's chief punishment for military crimes. Holding, as he did, that the Roman military service was an honourable calling, and one upon which a premium should be placed, he never allowed an unworthy legionary to follow his standards. During his last campaign in Africa he publicly degraded and dismissed¹ several superior Officers of the 10th Legion, who had been convicted of inciting the men to mutiny.² At an earlier period of his wars, finding his Officers were afraid to march against the German chief, Ariovistus, he told them in the presence of the whole army to take their men back to Maly, and he would go forward alone with the 10th Legion. "Upon this," says Plutarch, "the 10th Legion deputed some of their corps to thank Cæsar. The other legions threw the whole blame on their

¹ The following are the words of Cæsar's sentence: "You, Caius Avianus, instigated soldiers in the service of the State to mutiny against their Commanders. You oppressed towns which were under your charge. Forgetting your duty to the Army and to me, you filled a vessel with your own establishment, which was intended for the transport of troops, and at a difficult moment we were thus left through your means without the men whom we needed. For these causes and as a mark of disgrace I dismiss you from the Service, and I order you to leave Africa by the first ship which sails.

"You, Titus Salienus, Marcus Tiro, Caius Ausinas, Centurions, obtained your commissions by favour, not by merit. You have shown a want of courage, and encouraged a mutinous spirit in your companies. You are unworthy to serve under my command. You are dismissed, and will return to Italy."—Cæsar's "Commentaries."

² In setting before the Roman people a high standard of military honour Cæsar was only carrying out the traditions of Roman policy, which made military service the first duty of every citizen. How high this standard of duty was is shown during the Second Punic War, when the Senate refused to allow the refugees from Cannæ to join the army of Marcellus.

"The Senate could see no reason for entrusting the service of the Commonwealth to men who had abandoned their comrades at Cannæ while they were fighting to the death."—Livy, Book XXV, 5-7.

Officers, and all followed him with great spirit and alacrity.”¹ In the case of the English Army, the right, which is provided by the Army Act of 1881,² to discharge soldiers from the Service has of late years been largely used by courts-martial, and by those “competent military authorities” who are empowered to carry out the discharge of unworthy men. The adoption of this system, which was recommended in 1869 by the Royal Commission on Military Punishments, and is a necessary consequence of other important reforms introduced into the Army, is having a marked effect in improving the tone and discipline of English soldiers.³ The following statistics, extracted from the General Annual Return of the British Army for 1887, show that this is the case during the last decade :—

	1877.	1887.
Strength of the Army, exclusive of Officers and warrant officers.....	182,442	201,621
Number of men fined for drunkenness	25,909	21,122
Proportion of these per 1,000 men.....	140	104
Number of minor punishments.....	282,687	249,448
Proportion of these per 1,000 men.....	1,549	1,237
Number of court-martial punishments	15,154	11,688
Percentage to average strength.....	8	6
Net Loss from deserters.....	2,554	1,453
Proportion of net loss from deserters to 1,000 men ...	14	7
Number discharged by purchase ⁴	2,970	1,493

In the case of those armed forces which are recruited by voluntary means and not by conscription, the conditions of enlistment of recruits, of their periods of service, appointment, transfer from corps to corps, re-engagement, and discharge, as well as the duties of recruiting authorities, require to be determined by law. Upon the wisdom of such law, and upon the degree with which it is in sympathy with the habits and customs of the civil population, must depend in a large manner the discipline of the armed force which is raised under its authority. In conscript armies the duties of the recruiting officers are periodical and mechanical; but in voluntary armies they are constant and responsible. The physical conditions of the enlistment of recruits need not be discussed in this essay as they only have a

¹ Plutarch's "Lives"—"Julius Cæsar."

² S. 92, Army Act, 1881.

³ "The only head under which there was an increased waste for 1887, was discharge for misconduct. This, however, was not owing to increased misbehaviour on the part of the soldier, but to the fact that discharges for misconduct were much more freely authorized. The Service has in every way benefited thereby."—"Report of Inspector-General of Recruiting," 2nd February, 1888.

⁴ These last figures are quoted to show the increasing popularity of military service in England owing to the elimination of bad characters, whose presence in the Army used to disgust respectable recruits, and drove them to purchase their discharge.

remote bearing on discipline. They are regulated, on the one hand by the wish of the State to secure the best physical material available for its soldiers, and on the other hand by the ever-varying conditions of supply and demand, and by the attractions which civil life may offer as compared with military service. Age, however, is a matter of very direct concern to discipline. As a rule, the younger a man enters the Army the better. Habits of discipline are more easily acquired in early manhood than later on in life, when the character of the recruit has been already formed. If recruits are taken for military service at an early age, the necessity of closely inquiring into their antecedents and character is not so important, for it is the function of discipline to form character, and to mould the rough material into required shape. Similarly mental proficiency need not concern the recruiting officer when the recruit is young, and when facilities exist for mental improvement after enlistment. These considerations all point to the necessity of obtaining recruits at an early age, and where, as is now the case in England, service with the colours during peace is regarded as a period of training for the reserve, in which the military strength of the country really rests in war, there would seem to be good reason for assimilating the age of recruits to that fixed for conscript armies. As regards the English Army this would involve a reduction in the limit of age from 25 to 20 or 21 at highest.¹ If difficulty were found in obtaining a sufficient inflow of recruits at such ages, it would then be necessary to consider whether it would not be preferable to increase the attractions of military service by offering higher rates of pay, or other advantages, than to continue a system which enables deserters and men discharged for misconduct from the Army to elude the vigilance of the recruiting and approving officers, and re-enter the ranks. Public attention has been much drawn of late to this question of fraudulent enlistment, and in the interests of discipline and the further development of the reorganization of 1871, some drastic change in the recruiting law seems necessary to stamp out an evil which is one of great magnitude.² The feeling of the country has been so often expressed against any attempt to revive the practice of branding, or even against marking Officers and soldiers on entering the Army, that it would be useless to discuss any such proposal under existing circumstances. A reduction in the age of recruits would undoubtedly strengthen the hands of the recruiting officers in their efforts to prevent fraudulent enlistment.³ Whether

¹ If recruiting continues to improve at the same rate as has been the case in recent years, there would be little difficulty in reducing the limit of age. In his Report for 1887, the Inspector-General of Recruiting wrote as follows on the 2nd February last. "The Army is now up to its establishment, and the real difficulty at present is to keep it from overflowing." Out of 31,234 recruits who joined the Army in 1887, 23,382 were under the age of 21.

² "It will be seen that the cases of fraudulent enlistment still continue frequent. . . . In 1887 no less than 2,235 men serving in the Army claimed their discharge under the Royal pardon as having fraudulently enlisted."—"Report of Inspector-General of Recruiting," dated 2nd February, 1888.

³ A further remedy may be found in the proposal made by the Inspector-General of Recruiting that an attempt to fraudulently enlist into the Army should be an offence at common law.

this change is eventually made or not, the last word on the discipline of the English, or any other voluntarily recruited army, will always rest with the recruiting officers, and with the higher authorities who are responsible for the laws which guide them in performing their duties.¹

PART IV.—*Administration.*

“No General can accomplish the full work of his army unless he commands the soul of his men as well as their bodies and legs.”—SHERMAN.

Good law will not alone secure good discipline in an armed force. Good administration of the law is also required. Fear of punishment prevents open crime, but is no guarantee against its “screened existence.” Nor will fear promote a sense of duty, or of honour, or *esprit de corps*, and without these elements discipline is a mere negative quantity instead of an active force. Prison discipline,² it may be said at once, is not military discipline, and in discussing the conditions necessary to ensure the latter in an armed force, this is the first fact to lay hold of, and with regard to which a right understanding is indispensable. The stern repression which is required to control the felon will crush the spirit and destroy the self-respect of the soldier. Cheerful, ready, loyal obedience is not obtained by driving men into sulky submission. “Discipline should be iron,” said Skobelev, with the recollections of Plevna still fresh in his memory. “There can be no doubt about that: but it is established by moral authority of Officers over their men, not by the use of force.”³

No better example can be quoted in support of this assertion of

¹ How true this is may be seen from the following description of English soldiers in 1829 by the Duke of Wellington:—

“The man who enlists into the British Army is in general the most drunken, and probably the worst man of the trade or profession to which he belongs, or of the village or town in which he lives. There is not one in a hundred of them who, when enlisted, ought not to be put in the second or degraded class of any society or body into which he may be introduced; and they can be brought to be fit for what is called the first class only by discipline, and the precept of the old soldiers of the company, who, if not themselves in the second or degraded class, deserve to be placed there for some action or other twenty times in every year.”

The question as to how discipline should be “promoted and maintained” among such men must indeed have seemed beyond the reach of any law, no matter how well drawn up, or how wisely administered.

² Even in the case of convicts it has been found that “force is no remedy,” and the “moral” treatment of civil prisoners has led to a constant annual diminution of the convict population of Great Britain. In 1852, the convict population was double what it is now, while the general population was only two-thirds of its present strength. Sir Edward Du Cane attributes this to the establishment of reformatories and industrial schools, and to the endeavours, which are now made in all prisons, to “work on the higher feelings of the prisoners directly by moral, religious, and secular instruction, and indirectly by ensuring industry, good conduct, and discipline through appealing to the hope of advantage or reward.”—“Punishment and the Prevention of Crime,” by Sir Edward Du Cane, K.C.B., Surveyor-General of Military Prisons.

³ “Skobelev,” by Nemirovitch Dantchenko.

Skobelev's than the fate of the Persian army under Xerxes—already used to illustrate arguments brought forward in the early part of this essay. Xerxes relied on the "use of force;" while Spartan discipline rested on "moral authority." Before crossing the Hellespont the Persian monarch called before him Demaratus, an exiled king of Sparta, and explained the principles upon which he ruled his army.

"They who, like us, are under the command of one person, from the fear of their leader, and under the immediate impression of the lash, are animated with a spirit contrary to their nature, and are made to attack a number greater than their own; but they who are urged by no constraint will not do this."

Demaratus pointed out in reply that the Spartan view of discipline was exactly opposite to that held by Xerxes, resting as it did, not on fear, but on a high sense of duty, which enforced obedience even unto death.

"Although free, the Spartans are not so without some reserve; the law is their superior, of which they stand in greater awe than your subjects do of you: they are obedient to what it commands, and it commands them always not to flee from the field of battle, whatever may be the number of their adversaries. It is their duty to preserve their ranks, to conquer or to die."¹

There have been armies, such for instance as the Prussian Army under Frederick the Great,² and the English Army under the Duke of Wellington,³ which, governed on the principles laid down by

¹ Herodotus, Book VII, chap. ciii, civ.

² "He worked on man only through his passions; he, in fact, regarded the race as machines of organized animal matter to be moved into action, or restrained from activity, by the force of material things. As he thus appears to have considered man as an automaton, or mass of animated matter, he was led to despise him, and to mock the idea of his mental independence. He employed force as an engine of government, civil or military, and in this manner he laboured to extinguish independence of mind, which is all that gives value to man as a rational being. . . . It is generally known that the impression of fear was the principle assumed by the King of Prussia in driving the Prussian recruit into military form."—"Formation, Discipline, and Economy of Armies," by Jackson.

An army disciplined by fear may win battles; but it can never hope to achieve permanent political results. How insignificant were the political results of the Seven Years' War as compared with those of the Seven Months' Campaign of 1870-71! German unity would never have been accomplished by Frederick the Great.

"The elevated feelings which are necessary to the best kind of army were then wanting to the Prussian Service. In those ranks were not found the religious and political enthusiasm which inspired the pikemen of Cromwell, the patriotic ardour, the thirst for glory, the devotion to a great leader, which inflamed the Old Guard of Napoleon."—"Macaulay's Essays"—"Frederick the Great."

³ The following answer to a question put to the Duke of Wellington by the Royal Commission of 1836 gives in the Duke's own words a description of the English military system of discipline as in vogue during the Peninsular War: "I have no idea of any great effect being produced by anything but the fear of immediate corporal punishment. I must say that in hundreds of cases the very threat of the lash has prevented very serious crimes. It is well known that I have hundreds of times prevented the most serious offences by ordering the men to appear with their side arms. The first thing I did was to order that all the men must appear, if they appeared in the street at all, in their side arms. That was the first thing. I then

Xerxes, have yet been victorious in the field. The success of both these armies, however, was due to other causes than their discipline, which in neither case was founded on any durable basis. It lasted so long as the influence of fear remained, and disappeared when its pressure was removed. No one can read the account of the Peninsular War without coming to the sorrowful conclusion that the state of discipline of the English Army at that period of its history was as bad as it possibly could have been. It was not only that excesses, fearful and disgraceful, were committed after the assaults of fortified places, but at all times, except only in battle, whether in advance or retreat, on the line of march and in cantonments, down to the very end of the campaign, the conduct of the troops came under the continual censure of their Commander. Writing to the Military Secretary from St. Sever, as late as the 8th March, 1814, the Duke of Wellington thus alludes to the discipline of the Army:—

“There is no crime recorded in the Newgate Calendar that is not committed by these soldiers who quit their ranks in search of plunder.

. . . There is not much difficulty in posting a British Army for a general action, or in getting the Officers and men to do their duty in a general action. The difficulty consists in bringing them to the point where the action can be fought, and in the exertion to be made afterwards to derive all the advantage which any other troops in the world would derive from victory. . . . I have always found we lose more men in a pursuit than we do in any general action. . . . In ordinary circumstances, that is to say, when the army is quietly encamped in a position or cantonment, all goes on well enough, and the ordinary regimental discipline is sufficient to keep the soldiers in tolerable order, but when an exertion of any kind is to be made, the whole machine falls to pieces.”

When it came to actual fighting the splendid courage of the Officers and soldiers, directed by the genius of their great Commander, brought victory to the English arms, but the results of victory were never what they might have been had the discipline of the troops enabled the Duke of Wellington to make the most of his successes. As it was, each hard-won battle seemed only to be the signal to prepare for a new encounter, and each advance but the precursor of another retreat. It is impossible to follow the tedious progress of the campaign, relieved only as it was by the heroic deeds of our brave countrymen, without feeling that had the same state of discipline existed in the English Army in 1809–12 as characterized the Swedish Army in 1630–31, the retreats after Talavera and Salamanca would never have been necessary, and the Duke of Wellington, sweeping the Peninsula of Spain as Gustavus swept the territory of Germany, would have established his army in Paris before Napoleon had extricated himself from Moscow.

The greatest soldiers in the world—Alexander, Cæsar, Gustavus

ordered that the rolls be called every hour; and all those restraints were enforced by the fear of the lash. If it were not for the fear of the lash, who would appear in his side arms? I was quite sure that no man would venture to disobey, because if he ventured to disobey it would come to corporal punishment.”

Adolphus, and Napoleon—all comprehended the superior value of moral power over that established by fear, and a study of their lives shows that this power, which each possessed in a very high degree, never deserted them even at times of greatest peril, "Fly, cowards, I will subdue the world without you; Alexander will never want soldiers as long as he can find men,"¹ such were the words with which Alexander rallied his troops when on the point of being abandoned in Asia. Cæsar's² methods of enforcing discipline have already been described, but another allusion to his life will perhaps be pardoned if only to recall the prompt way in which he brought the mutineers of the 10th Legion to their knees by means of one word³ pregnant with meaning to those who had so often followed him to victory.

With Napoleon⁴ moral power was an art as well as a gift, and he owed his extraordinary influence over French soldiers not merely to the "personal magnetism" of his character, but to his habitual study of the means of rousing their enthusiasm and exciting their military

¹ "Plutarch's Lives"—"Alexander and Julius Cæsar compared."

² The moral hold which Cæsar had of his legions is testified to by nearly every writer on Roman history, though curiously enough Dr. Arnold, who has done ample justice to Hannibal's memory, could find nothing admirable in the character of Cæsar.

"Such likewise was the affection of his soldiers, and their attachment to his person, that they who under other Commanders were nothing above the common rate of men, became invincible where Cæsar's glory was concerned, and met the most dreadful dangers with a courage nothing could resist."—"Plutarch's Lives"—"Julius Cæsar."

Another authority writes: "A born ruler, he governed the minds of men as the winds drive the clouds. . . . No General has ever collected an army out of unyielding and refractory elements with such decision, and kept them together with such firmness."—"Momsen's History of Rome," vol. iv.

"Truly," writes Montaigne of Cæsar, "he ought to be the breviary of all true soldiers as being the absolute and perfect chiefe patterne of military profession. . . . No General of warre had ever so much credit with his souldiers."—"Montaigne's Essays."

³ He addressed them as "*Quirites*" (citizens) instead of by the usual familiar name of "*Commilitones*" (comrades) telling them at the same time they might retire into civil life as he did not want them any more.

⁴ One of the finest instances of Napoleon's moral power occurred in the Italian Campaign of 1796, when he restored discipline among the men of Vaubois' Division after their disorderly retreat on Verona. Both Officers and men had displayed great cowardice and want of discipline in abandoning their position at the front, but instead of tying them up to the halberds, Napoleon addressed them in the following words: "Soldiers, I am not satisfied with you. You have shown neither discipline nor constancy. You have yielded on the first reverse. No position was sufficient for you to rally at. There were some in your retreat that were impregnable. Soldiers of the 85th and 39th, you are no longer French soldiers. Give me those colours, and let me have written on them, 'They belong no more to the Army of Italy.'" Then we are told by La Cases, writing at the dictation of Napoleon, "that a gloomy silence prevailed through the ranks, and the old soldiers were seen to wipe away their tears. 'General,' they cried, 'place us in the vanguard, and you shall see whether we belong to the Army of Italy.'"

The above is a typical example of the effect so often produced by Napoleon's addresses and proclamations to his troops. Florid, high-flown, and sometimes written in deplorable taste, his words nevertheless went straight to the heart of the French soldiers, and over and over again restored them to a sense of their forgotten duty.

spirit. After all that has been said of Gustavus Adolphus his name can now be passed over, but Hannibal must not be forgotten, as, though mentioned last, his life affords the most notable example in military history of the moral ascendancy of man over man. Hannibal is the only great General of ancient times whose memory history has never been able to slander.¹ Although the records of his career are scanty, and derived from foreign sources, the simple narrative of his life is sufficient testimony to the constancy of his conduct and the chivalry of his character.² In that brilliant sketch of the great Carthaginian soldier, which Dr. Arnold happily lived to revise, Hannibal's military characteristics are thus alluded to:—

“As a General his conduct remains uncharged with a single error. . . . His knowledge of human nature and his ascendancy over men's minds are shown by the uninterrupted authority which he exercised alike in his prosperity and adversity over an army composed of so many various and discordant materials, and which had no other bond than the personal character of their leader. . . . The long inactivity of winter quarters, trying to the discipline of the best national armies, was borne patiently by Hannibal's soldiers. There was neither desertion nor mutiny amongst them; even the fickle men of the Gauls seemed spell-bound. For the Gauls and the Spaniards and the Africans were overpowered by the ascendancy of Hannibal's character; under his guidance they felt themselves invincible. With such a General the yoke of Carthage might seem to the Africans and Spaniards the natural dominion of superior beings.”

The foregoing considerations, supported as they have been by a few out of many examples which can be cited from military history, seem to establish the fact that moral authority is a matter of upper-

¹ Even such a hostile critic as the Roman historian Livy thus writes of Hannibal: “Such was his behaviour, and so conciliating, that in a short time the memory of his father was the least among the inducements to esteem him. Never man possessed a genius so admitted to the discharge of offices so very opposite in their nature as obeying and commanding; so that it was not easy to discern whether he were more beloved by the General than by the soldiers.”—Livy, Book XXI, chap. iv.

² The best authorities reject Livy's account of the slack discipline maintained by Hannibal during the winter of B.C. 216 in Capua. If some indulgence was allowed to the troops after the severe campaigning which ended with Cannæ, this must have been speedily checked when the army marched out of Capua in the spring of B.C. 215. An army so debauched and disorderly as that pictured by Livy in the 18th chapter of Book XXIII could never have remained, unaided and unrecruited, for thirteen years after the victory of Cannæ in a hostile country, and then finally embarked unopposed when Hannibal was recalled to Carthage.

As regards the charge of cruelty, which Livy brings against Hannibal, it is noteworthy that neither he nor Polybius instance any single specific act to substantiate the general charge.

No act of Hannibal's during all his wars can be compared for inhumanity with the manner in which the Consul Nero announced Hasdrubal's defeat to the Carthaginian Chief by throwing his brother's head in front of Hannibal's outposts.

The story about Hannibal compelling the Roman prisoners who were taken at Cannæ to fight as gladiators in his presence, rests on no better authority than that of Diodorus and Pliny, and ill tallies with the clemency shown by the release of the prisoners taken at the Battles of the Trebia and Lake Thrasymentum.—Polybius III, p. 85.

most moment for the promotion and maintenance of discipline in an armed force. How can such moral authority be acquired, or, in other words, what should be the relations existing between Officers and soldiers, and how far should these relations be carried in the course of daily duty? This is the final question which remains for investigation.

The first great necessity, and one which is the foundation of true military discipline, is that Officers should know their men. Moral authority depends on personal power, and this can only be acquired by an intimate acquaintance with those whom it is sought to influence. The excellent discipline maintained in the German Army of the present day is undoubtedly due to the closeness of the intimacy which binds the soldier to his Officer.¹ In our Army the regimental Officers, down to a period as late as the outbreak of the Crimean War, lived wholly apart from their men,² and during peace the "personal contact" (the value of which was explained in an earlier part of this essay) can hardly be said to have existed at all. Generally speaking the soldiers only knew their Officers as awarding them punishment. As during the Peninsular War, so at all times, English Officers have led their men in battle with the utmost bravery, but when fighting was over their duties to those under them were formerly supposed to have ended.³ In natural consequence discipline, which was maintained with a stern hand in the presence⁴ of the

¹ "The Captain and his assistants, the company Officers, occupy themselves almost continually with their men. These two classes are brought into very close personal relations without prejudice to discipline, but rather with a contrary effect. This happy reciprocity has this merit, that besides the genuine military spirit which prevails in the army generally, in the most murderous battles of the present war the soldiers followed their leaders amid the destructive shell, mitrailleuse, and chassépot fire of the enemy, with a devotion which was truly touching. The soldier has confidence in his Officer, and the Officer knows that he can depend on the soldier."—"Army of the North German Confederation," by a Prussian General.

² To such an extent was this separation of Officers and men carried in those days that, on the death of Sir John Moore, the Duke of York drew attention in general orders to the marked exception which that great disciplinarian was to the general rule of Officers.

The following are the terms of the G.O.:—

"The character of Sir John Moore exhibits one feature so particularly characteristic of the man, and so important to the best interests of the Service, that the Commander-in-Chief is pleased to mark it with his peculiar approbation. The life of Sir John Moore was spent among the troops."

³ "Our Officer," wrote the Duke of Wellington in 1829, "is a gentleman; we require that he should be one, and above all that he should conduct himself as such; and most particularly in reference to the soldier, and to his intercourse with the non-commissioned officers and soldiers. Indeed, we carry this principle of the gentleman, and the absence of intercourse with those under him, so far, that in my opinion the duty of a subaltern Officer, as done in a foreign army, is not done at all in the cavalry or the British infantry of the line. It is done in the Guards by the sergeants. Then our gentleman Officer, however admirable his conduct on a field of battle, however honourable to himself, however glorious and advantageous to his country, is but a poor creature in disciplining his company in camp, quarters, or cantonments."—"Memorandum on the Discipline of the Army," by Field-Marshal the Duke of Wellington, K.G., 29th April, 1829.

⁴ There were occasions, however, when even in the presence of their Officers the

Officer, was relaxed behind his back. The Duke of Wellington repeatedly expressed his bitter sense of disappointment at the feeble touch kept by Officers on their men, and his general orders and despatches home during the Peninsular War abound with reflections on their conduct. In his letter to the Military Secretary written from St. Sever on the 14th March, 1814, as already quoted, he gave vent to his feelings in the following words :—

“ I have no hesitation in attributing the evil to the utter incapacity of some Officers at the head of regiments to perform the duties of their situation, and the apathy and unwillingness of others, . . . and to the difficulty, if not impossibility, of punishing any Officer for neglect of duty when he is to be tried by others, each and all of whom have been guilty of the same if not greater neglects. . . . I attribute the want of discipline in the Army entirely to the regimental Officers who neither know, nor understand, nor endeavour to carry into execution any of the Orders of the Army which have for their object the prevention of the committal of crime.”

In spite of all his efforts, and his own fine example, which was never at fault, the Duke of Wellington was unable to instil discipline into the armies which he commanded. For the system which he was required to administer was radically defective, and in the presence of such defects as existed individual effort was powerless to achieve any lasting good. “ Habits of obedience to orders, subordination, regularity, and mutual confidence between Officers and soldiers,” these qualities, which constitute the Duke of Wellington’s definition of discipline,¹ are not the sudden outcome of war, but the gradual result of systematic training during peace. It was a sense of helplessness to cope with acknowledged evil which seemed to increase the disappointment of the great English Chief, and led him, not always generously, to attach blame to individuals who were in no way responsible for the system which they had been taught to follow.

The change of system dates from the close of the Crimean War. Then, for the first time in the history of the English Army, the regimental Officers began to undertake duties which had previously been relegated to non-commissioned officers. Forsaking the *rôle* of

spirit of disorder ran riot among the soldiers. The following G.O. is by no means a solitary instance of its kind :—

G.O., Lesaca, 8th October, 1813.

1. The Commander of the Forces is concerned to be under the necessity of publishing again his orders of the 9th July last, as they have been unattended to by the Officers and troops which entered France yesterday.

2. According to all the information which the Commander of the Forces has received, outrages of all descriptions were committed by the troops in the presence even of their Officers, who took no pains whatever to prevent them.

3. The Commander of the Forces has already determined that some Officers so grossly negligent of their duty shall be sent to England that their names may be brought under the attention of the Prince Regent, and that His Royal Highness may give such directions respecting them as he may think proper, as the Commander of the Forces is determined not to command Officers who will not obey his orders.

¹ G.O., Badajoz, 24th September, 1809.

policemen, they sought to qualify themselves as the instructors, the trainers, the masters of their men. The alteration in the system of enlistment which took place later on increased the necessity for the interference of Officers, as it decreased the number of trained men and non-commissioned officers available for instructing recruits. In carrying out these new responsibilities, the Officers were compelled to associate with the rank and file in a way that was never before necessary. This intercourse is no longer confined to hours of drill and instruction, but is continuous during times of recreation—at athletic meetings and evening amusements, which are now as much matters of concern to English Officers as the actual official duties of their men. The intimate comradeship which has thus been created between Officer and soldier is having a marked¹ effect in raising the tone of the rank and file of the Army, and in correspondingly raising the discipline.

The Duke of Wellington was not a military reformer; but had he lived to see the working of the new system described above, and which has enabled His Royal Highness the Commander-in-Chief to dispense with the halberds and rely on the General Orders of 1887² to maintain discipline, he would surely have endorsed the words which have been chosen as the motto for this essay, and which were uttered on a memorable occasion by a late venerable Englishman³—"Force is no remedy."

Passing now from the special case of the English Army, which, however, is particularly adapted to illustrate the arguments contained

¹ "Of late years there has been a great change taking place in the relations between Officers and men, and the social standing of soldiers has year by year improved."—Extract from speech of Major-General Sir Redvers Buller, V.C., K.C.M.G., Annual Meeting of the Soldiers' and Sailors' Families Association, 5th May, 1888.

² In his evidence given before Lord Randolph Churchill's Committee on the Army Estimates (Q. 2553, Second Report), Colonel Lascelles, A.A.G. at Headquarters, described the change introduced by the General Orders of 1887, as "One which may almost be called a revolution in the administration of the discipline of the Army."

³ Mr. Bright. Speech at Birmingham, 16th November, 1880. "Force is no remedy." Though uttered by a member of the Peace Party, these words might have been appropriately placed at the head of the Circular Memorandum addressed by H.R.H. the Duke of Cambridge to General Officers commanding districts and Officers commanding corps in introducing the changes made by the General Orders of 1887, in the administration of discipline in the Army. The following extract from this Memorandum shows the spirit in which these changes were conceived:—

"Love of his regiment, and a regard for its reputation, soon come to the young soldier, and he should be impressed with the conviction that it is his interest, and should therefore be his object, to maintain its high name and character by his own individual good conduct. He should learn to feel, through the manner in which he is dealt with by his Captain and his Lieutenant-Colonel, that they are solely actuated by this regimental feeling, by their love of the Army, and the deep interest they take in the reputation of all their comrades of every rank. Nothing tends more to impress soldiers with this conviction than the maintenance of a healthy, manly discipline with the minimum of punishment."—Extract from Circular Memorandum, War Office, 1st January, 1887.

It is interesting to compare this with another Circular Memorandum quoted further on, and dated Freneda, 28th November, 1812.

in this essay, to a more general consideration of the subject under discussion, there are certain characteristics of sound disciplinary administration which it may be well to examine in regular order.

I. *Popularity*.¹—This, as may be supposed from what has already been said, is not to be despised as an element of power in promoting discipline in an armed force. A popular Officer can command obedience at times when another Officer would only receive a half-hearted support. It is important, however, to notice that popularity is not acquired by courting its advent, but rather by avoiding the appearance of seeking it. The most popular Officer, whether General or subaltern, is he who is most firm, most just, most hardworking, most attentive to the wants of his men, most able to lead them in war and train them in peace. The best disciplinarians—using the word disciplinarian as it is understood in its application to such men as Hannibal, Cæsar, and Gustavus Adolphus—have always been popular with their followers. Cæsar's popularity with the 10th Legion is proverbial, yet the discipline of the 10th was firmer and stronger than of any other Roman legion. Gustavus Adolphus was worshipped by his soldiers, and we have seen how perfect was the discipline of the Swedish armies, both before and after victory. Skobelev, perhaps more than any other Commander of this generation of soldiers, commanded the love of his followers; yet no General ever exacted more from his troops, worked harder with them, or maintained a stronger rule over them. The 16th Division, which he commanded during the Russo-Turkish War of 1877-78, was a model of exemplary discipline. "There was scarcely anywhere a corps," writes an eyewitness who accompanied Skobelev during his famous march from Kazanlik to Adrianople, "where the power of the Officers was greater or the discipline more severe."²

II. *Attention to Details of Interior Economy*.—This is specially a matter of concern to junior regimental Officers. "The discipline and regularity of all armies," wrote the Duke of Wellington,³ "must depend upon the diligence of the regimental Officers, particularly the subalterns." Material comfort is essential to healthy *morale*, and a contented army has always been found to preserve its discipline. Everything connected with the soldier's welfare and training—his pay, clothing, food, health, education, and amusements—should be a matter of concern not to an orderly Officer changed from day to day, but to the immediate superior Officer⁴ of the soldier in question; and

¹ "The greatest talent of a General," writes Plutarch, "is to secure obedience through the affection he inspires."

² Nemirovitch Dantchenko. Skobelev was born a leader of men, and possessed, in a high degree, that "personal magnetism" of character which Lord Wolseley describes as necessary to a successful Commander. The Russian authority quoted above thus alludes to Skobelev's relations with his men: "He was not one of those Generals who like their men at a distance. The dandified, spoilt, and fastidious Skobelev could live the same life as his soldiers, share their discomforts, their squalor, and their privations, and do this so easily that they were not astonished at it."

³ Despatch to Viscount Castlereagh, Abrantes, 17th June, 1809.

⁴ This is a most important point in the maintenance of discipline. It is some-

the "moral authority" of the Officer is strengthened or weakened just in proportion as he exercises, or neglects to exercise, direct personal supervision over details of interior economy. What it is of special importance to emphasize is that the force of discipline should be binding at all times and in all places. A soldier ought to have one nature, and one only, and that nature should always be disciplined, and everywhere under control. The system which teaches him to have two natures—one for parade and another for the barrack-room, one before his Officer and another behind his back—such a system will not satisfy the conditions which are essential for success in modern war.

III. *The Force of Example.*—This is another important element in the relations between Officers and soldiers. In the enforcement of discipline in an armed force, example¹ has even more influence than precept. A high, bright, cheerful example coming from above will be speedily caught up below. A superior can exact readier obedience from an inferior when he himself shows a readiness to obey. The obedience, too, that is here meant is not mere technical compliance with orders, but loyal submission to superior will. An Officer receiving an order should seek to catch its tone, as well as understand its letter, and should pass it on in this spirit to those below him. Nothing is so detrimental to military discipline as any inclination to "carp"² at orders received, or to criticize them in a spirit adverse to the intentions of the authority from whom the orders emanated.

"Subordination in the Officers is the soul of discipline; for if they do not exhibit the most explicit obedience in executing orders given to them, their example will soon be followed by the soldiers, and pervading the whole army will taint the very principle of military order."³

IV. *Regularity.*—Regular administration is also essential to the promotion and maintenance of discipline in an armed force. Relaxation of rule is fatal to discipline, which, it should never be forgotten, is hard and strict, and requires the practice of habitual self-denial. In time of war when the reality of active service is present, the

times said that "duty has to be got through," but that it does not much matter by whom, and that the orderly Officer can very well perform it for other Officers. If, however, the arguments brought forward in this essay are worth anything at all, they do oppose a most distinct contradiction to this notion of "duty," which is not something to be "got through" merely for name's sake, but to be performed by Officers in the interest of their own self-discipline, as much as in the interests of their men. Everything depends on the close union of Officers and men in small bodies, and upon this union being maintained intact on all occasions.

¹ "Unless we should ourselves set an example of obeying strictly the orders of our superiors, we cannot expect that our inferiors will obey ours."—Extract from letter of the Duke of Wellington to the Conte de la Bisbal, dated Freheda, 17th March, 1813.

² This was another difficulty the Duke had to contend with during the war in Spain. Writing to Mr. Stuart on the 11th September, 1810, he observed that there "was a spirit of 'croaking' in the Army which is highly injurious to the public service, and which I must devise means of putting an end to, or it will put an end to us."

³ Essays on "Military Duties and Qualities," by Lieutenant-General Lord de Ros.

necessity of discipline is always apparent, but during peace the temptation to relax routine and soften law continually recurs. The tendency to yield to this must be resisted, and a sustained effort made to preserve discipline at constant high pressure. Idleness is particularly to be guarded against as a fruitful source of deterioration in discipline.

"An army is composed for the most part of idle inactive men, and unless the General has a constant eye upon them, this artificial machine will very soon fall to pieces, and nothing but the bare idea of a disciplined army will remain."¹

The value of barrack life cannot be exaggerated. A militia force is never so highly disciplined as a regular force which is kept in barracks or camp, when the touch between all ranks is constantly preserved. During periods of long-continued peace, camps of exercise should be resorted to, and the reserves of the National Army called out for training. It was in the Camp of Boulogne² that Napoleon perfected the discipline of the French Army which gained the victories of Austerlitz, Jena, and Wagram.

V. *Self-discipline*.—The necessity of self-discipline should be constantly impressed on all ranks of an armed force. It was with this idea in view that so much stress was laid in Part III of this essay on the principles which should govern the laws of discipline. In order to secure self-discipline, or, in other words, the co-operation of all ranks in preserving order among themselves, military law must be clear, straight, intelligible, and immutable.³ Unless this is so, the necessity for obeying the law cannot be brought home to those concerned, and the virtue of obedience will be degraded into mechanical submission to superior will. Immutability of law is assuredly a point of extreme importance. There will remain ample scope for wise and circumspect administration even when the law is so immutably fixed as to be placed beyond risk of disturbance by arbitrary alterations and personal whims of individual Officers who are entrusted with the duty of administering it. It would be easy to multiply instances of the stress laid upon self-discipline by great Commanders of both ancient and modern times. A notable example occurred when Xenophon assumed command of the Ten Thousand Greeks after the Battle of Kunaxa. "Above all things," he said, in

¹ "Military Instructions of Frederick the Great to his Generals;" translated by Major Foster.

² "Satisfied with their lot in this great encampment, the soldiers were singularly tractable and obedient. Constantly occupied and amused by the spectacle of sea-fighting or frequent reviews and mock battles, they neither murmured at the exactions of a rigid discipline, nor experienced the usual monotony and languor of a pacific life in camp. . . . Constant employment was the true secret both of their good health and docile habits. Neither Officers nor soldiers were ever allowed to remain any time idle."—Description of the Camp of Boulogne, Alison, chap. xxxix.

³ Immutable as far as regards those who have to administer its provisions. The necessity of altering military law from time to time, and adapting it to meet the ever-changing conditions of a progressive science, is indisputable. This, however, is the function of the governing authorities, not of executive Officers.

his first address to his troops after his election to the chief command, "let us maintain order, discipline, and obedience to the Commanders, upon which our entire hope of safety depends. Let every man promise to lend his hand to the Commander in punishing any disobedient individuals."¹ It was owing to the loyal support which Xenophon received during his celebrated retreat from all his followers, and which he secured by his own tactful command, that the force was extricated from the desperate position in which it was placed after the seizure and execution of the Greek Generals by Tissaphernes. So well maintained was the self-discipline of the force to the very end of the retreat that when outrages were committed by some individual soldiers at Kerasus, Xenophon called the army together, and demanded the punishment of the mutineers, who were sentenced to death by the unanimous vote of the assembled troops.²

VI. *Self-respect*.—Self-discipline is the result of self-respect. No opportunity should therefore be lost of developing this latter quality in every Officer and soldier. In this connection praise and blame are useful factors, provided they are apportioned with discrimination. Praise when merited promotes friendly emulation, when undeserved it only fosters jealousy. Blame should be reserved for censuring crime, and not used to condemn errors of judgment or mistakes at drill. Officers must bear in mind that when their instructions are not carried out exactly as they intended, the mistake is generally owing to the instructions being incomplete, and therefore not understood. It is of importance in encouraging self-respect to strengthen the hands of subordinate Officers and non-commissioned officers, and most particularly to avoid weakening their authority by hasty and intemperate censure in the presence of their inferiors. Mistakes should be quietly and deliberately corrected, and not seized on as occasions for indiscriminate abuse. Much might be written on this subject alone, but it would be impossible to find better words than the

¹ Xenophon: "Anabasis," III, pp. 2, 25.

² *Ibid.*, V, pp. 27—30, and Grote, chap. lxxi.

Xenophon's speech on this occasion, and his appeal to the troops to obey him and the subordinate Generals on the ground that they had all been elected by the universal suffrage of the army, abound in matter calling for deep reflection on the part of the military student.

Grote thus alludes to the speech in chapter lxxi of his "History of Greece." "This," referring to the election of Xenophon, "is the cardinal principle to which he appeals, as the anchorage of political obligation in the mind of each man, as the condition of all success, all safety, and all conjoint action; as the only condition either for punishing wrong or protecting right; as indispensable to keep up their sympathies with the Hellenic communities, and their dignity either as soldiers or citizens. The success of the speech shows that he knew how to touch the right chord of Grecian feeling. No serious acts of individual insubordination occurred afterwards, though the army collectively went wrong. And, what is not less important to notice, the influence of Xenophon himself, after his unreserved and courageous remonstrance, seems to have sensibly augmented."

Montaigne, in his essay on Julius Cæsar, gives a remarkable, and presumably authenticated, example of the self-discipline of Cæsar's troops, "when, having had some defeat neere unto Dyrrachium, his souldiers came voluntarily before him, and offered themselves to be punished, so that he was more troubled to comfort than to chide them."—"Montaigne's Essays."

following, which are a perfect essay in themselves, and which, though written with special application to the English garrison of India, are profoundly true of the relations which ought to exist between the Officers and soldiers of all armed forces :—

“All depends in the various gradations of military control on the spirit in which the controlling power is exercised, and on the tact of him who exercises it. Be kind, considerate, and conciliatory; scrupulously regard the feelings of those under you; avoid aught that can weaken their legitimate authority, or diminish the respect of their inferiors; treat not blunder as a crime; assume that what is evidently unknown is simply something forgotten; and if you have to do with well-conditioned men, not as an offence. I speak from the experience of more than forty years both in civil and military life. I can only plead my profound conviction that the British soldier, even of the roughest stamp, is, if wisely and kindly treated, susceptible of culture—physical, intellectual, moral, and professional—far in excess of that which is generally supposed to be attainable by him; that just as you approximate a private soldier intellectually, morally, and professionally to the standard of his Officers, do you increase his commercial value; and that the interests of India demand that the highest possible culture of all kinds should be bestowed on the members of the English garrison, and the highest possible development given to their capacities both individual and corporate.”¹

These are not the words of a mere military student, but of a practical English soldier—James Outram, the “Bayard of India.” They are weighty words, and their weight is increased by the fact that they were written soon after the termination of those terrible struggles round Lucknow, and were doubtless inspired by the recollection of the discipline which the writer had maintained during long months of severe trial in the gallant little garrison of the Alum Bagh.

PART V.—*Conclusion.*

“We are an excellent Army on parade, and an excellent Army to fight; but we are worse than an enemy in a country; and take my word for it that either defeat or success would dissolve us.”—WELLINGTON, Letter to Lord Castlereagh, June 17, 1809.

The principles laid down by Sir James Outram are the principles which are gradually taking root in the British Army, and which received official ratification in the General Orders of the 1st April, 1887. That the new system of administration is working to a successful issue may be seen from the figures of consecutive annual Returns. There is better evidence, however, than the evidence of figures. There is the testimony of war itself. The contrast between the disorderly conduct of the English troops during the retreat from Burgos in

¹ “Miscellaneous Questions affecting the Organization and Efficiency of the Indian Army.”—Memorandum by Sir James Outram, Bart., G.C.B.

1812, and the discipline maintained in all the recent operations of the Army, whether in Afghanistan, Egypt, or elsewhere, is an indisputable witness to the truth of statistical evidence.

For what were the circumstances of the retreat from Burgos? The retirement of the Army had become necessary for strategical reasons, not after defeat, but after a victorious campaign, which had included such successful operation as the capture of Ciudad Rodrigo and Badajoz, the assault of Almaraz, and the Battle of Salamanca. The Army was not pressed by the enemy, nor were the marches long, nor the weather inclement, nor the privations great;¹ yet the discipline of the troops so deteriorated that the historian of the Peninsular War estimates the loss from stragglers at not less than 9,000,² and describes the retreat as being marked throughout by most "intolerable disorders" due to the "habitual negligence of the regimental Officers." So incensed was the Duke of Wellington with the conduct of the troops that, when he arrived in winter quarters, he issued that celebrated Circular,³ the justice of which Napier⁴ is reluctantly compelled to admit,⁵ and which will remain on record as the most scathing rebuke a General in the field has ever addressed to an Army under his command. "I am concerned," wrote the Duke, after enumerating the irregularities committed, "to have to observe that the Army under my command has fallen off in this respect (discipline)

¹ *Vide* Lord Wellington's Circular to Officers Commanding Divisions and brigades, dated Freneda, November 28, 1812.

² Napier. The following extracts from the "History of the Peninsular War" may be quoted to illustrate the want of discipline which characterized the retreat:—

"Five hundred of the rear-guard, under Cole, chiefly of one regiment, broke open the houses, plundered, and got drunk. On this occasion there was no want of provisions, no hardships to exasperate the men, and yet I, the author of this History, counted on the first day's march from Madrid seventeen bodies of murdered peasants."

Again he writes—

"Such outrages were perpetrated on the inhabitants along the whole line of march that terror was everywhere predominant, and the ill-used drivers and muleteers deserted by hundreds. Hence Kennedy's operation in some measure failed; the greatest distress was incurred, and the Commissariat lost nearly the whole of the animals and carriages employed; the villages were abandoned, and the under-commissaries were bewildered and paralyzed by the terrible disorder thus spread along the line of communications."

Again, later on in the retreat—

"The Army bivouacked in the evening behind the Manilla stream; but though the march was not more than 12 miles the stragglers were numerous, for the soldiers, meeting with vast herds of swine, quitted their colours by hundreds to shoot them, and such a rolling musketry echoed through the forest that Wellington at first thought that the enemy was upon him. It was in vain the Staff Officers rode about to stop this disgraceful practice; it was in vain that Wellington himself caused two offenders to be hanged; the property of whole districts was swept away in a few hours, and the Army was in some degree placed at the mercy of the enemy. The latter, however, were content to glean the stragglers, of whom they captured 2,000."—Napier, Book XIX, chap. v.

³ Dated from Freneda, November 28, 1812.

⁴ Napier's "Peninsular War," Book XIX, chap. vii.

⁵ Napier, however, exonerates the Guards and the Light Division.

to a greater degree than any army with which I have ever served, or of which I have ever read.”¹

Turning now to the case of the retreat of the River Column down the Nile in 1885—a small measure of war as compared with the retreat of the English Army from Burgos in 1812, yet none the less useful as an illustration—we find a totally different state of discipline in existence. The order for this retreat, which like the retreat from Burgos, was also undertaken for strategical reasons, came upon the troops as a crushing disappointment;² yet, so far from leading to misconduct, the signal to turn back seemed only to stiffen the discipline which had marked the advance of the column under physical difficulties without parallel in war. “I cannot,” wrote the Officer in command of the column on the occasion of its break up, “close this report without dwelling upon the splendid behaviour of the regimental Officers, non-commissioned officers, and men of the column. The life of the men has been one of incessant toil from the first to the last day of the expedition. In ragged clothing, scarred and blistered by the sun and rough work, they have worked with constant cheerfulness and increasing energy. *Their discipline has been beyond reproach*: and I do not hesitate to say that no finer, more gallant or more *trustworthy* body of men ever served the Queen than those I had the honour to command in the River Column.”³

If a further example is asked for from recent English military history, there is the case of the now historic march undertaken by Sir Frederick Roberts from Cabul to Candahar in 1880, during which operation of war not a single man was lost by straggling, and not a single instance occurred of serious crime. The discipline maintained was as perfect as it is possible to exact from any troops, and was due, as Sir Frederick Roberts repeatedly said⁴ after his arrival in England, to the loyal co-operation which he received from all ranks in his efforts to preserve order. “I may say with truth,” he said in his speech at the Fishmongers’ Hall, “that there was not an Officer or man, British or native, who was not animated by the same high spirit of courage and discipline, which are so essential to all military success.”⁵

When, then, the question is asked, as it has been in the subject of this essay, by what means discipline can be best promoted and main-

¹ Is it possible to conceive the circumstances under which Lord Chelmsford, or Lord Wolseley, or Sir Frederick Roberts, or any other General who has lately commanded troops in the field, would have to address such words to English Officers and soldiers of the present day?

² The Officer in command of the column describes the effect of the order, when he first received it, as sending a “cold shiver” through him.—“The River Column,” by Major-General H. Brackenbury, C.B.

³ Despatch of Brigadier-General H. Brackenbury, C.B., to General Lord Wolseley.—*Vide* “The River Column.”

⁴ See his various speeches, especially that delivered in the Mansion House when the freedom of the City of London was conferred on him.—*Vide* “Times” report, dated February 15, 1881.

⁵ Fishmongers’ Hall, December 10, 1880.—“Times” report, December 10, 1881.

tained in an armed force, the answer is to be found, not only in the numerous illustrations existing in both ancient and modern military history—a few only of which have been quoted in these pages—but especially in the experience of the English Army during the last 100 years. That experience shows that true military discipline—discipline, that is to say, which is equally maintained before, during, and after battle; discipline which is relaxed neither in victory nor in defeat—can only be secured by the moral power of Officers deriving their authority from good law wisely administered by means of a sound system of organization. How moral power is acquired, and what are the attributes of good law, wise administration, and sound organization, it has been the endeavour of the writer, however unworthily, to show during the course of this essay. Imperfectly brought forward as the arguments have been, there is some consolation in feeling that the lessons of history are a witness to their truth; and it is for this reason possible to assert, not in any spirit of egotistic confidence, but with the force derived from confirmed conviction, that no other way of promoting and maintaining discipline in an armed force exists except that which it has been attempted to describe in this essay, which is now respectfully and humbly submitted for the consideration of the Council.

All that it seems necessary to ask leave to say in conclusion is that, as with our allies, so with ourselves, finality has not yet been reached. Much remains, much must always remain to be done in the further progress of that new departure, which was openly taken last year. The general orders of 1887 have committed us to a “revolution,” from which there can now be no loophole of escape. Having put our hands to the plough it is not possible to look back. The spirit of an army can no more lie fallow than the spirit of an individual. It is for ever living, moving, changing. While we take care that it moves onward in its course of conservative progress it is for us—the Officers, non-commissioned officers, and men of the Army—to see that it moves, not by leaps and bounds, but patiently, surely, hopefully, and always kept under the influence of firm control. Not with pessimist minds, not with any hankering after the dry bones of bygone days, yet ever mindful of the lessons of history, must this movement be directed by those, to whom it has fallen to carry forward into a bright future the traditions of a glorious heritage. Then shall be presented to the world such a spectacle as has never yet been seen, of a great National Army, voluntary in its origin, democratic in its sympathies, imperial in its instincts—loyal to its Sovereign, loyal to its country, loyal to itself, respected and self-respecting—a tremendous weapon of resistless strength,

“A glorious company, the flower of men,
To serve as model for the mighty world,
And be the fair beginning of a time.”

Tennyson’s “Guinevere.”

Friday, March 8, 1889.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

FORAGE FOR MILITARY PURPOSES.

By GEORGE FLEMING, C.B., LL.D., F.R.C.V.S., Principal Veterinary Surgeon of the Army.

I AM not aware that the subject of forage for military purposes has yet been brought before the Members of this Institution for consideration and discussion; and yet it is one which, from several points of view, certainly deserves notice, especially from those who have to provide for the wants of mounted corps, whether during peace or in the field, as well as the Officers of these corps. While in quarters the subject may not seem of any moment, and particularly if the forage is abundant and of good quality; for then it is provided by the contractor in the usual manner, and, if it meets with the requirements of the contract, no further heed may be given to it. But if it is of indifferent quality, or the contractor is not moved by conscientious scruples, either as to quantity or quality, then the case is different; and only those Officers who have had long experience of forage and forage inspections know what vigilance and care are demanded in guarding against deception, and consequent injury to their horses, either from deficient quantity or improper quality.

The supply of forage in the field is always of importance, sometimes urgently so, and it is to this supply that I shall mainly allude in the brief space of time allowed me. For if it be true that the hay and corn market is not so expensive as the horse market in peacetime, then it must be accepted as still more true during war, when horses are so necessary, so difficult to replace, and when so much depends upon their being maintained in the highest state of efficiency. At all times it must be recognized that bad food makes bad horses, and insufficient food produces weakly ones; and while at any time bad or weakly horses are undesirable, on active service they are most objectionable in every way.

In considering the subject of forage for military purposes, I propose, with your permission, to deal with it under the following heads, and chiefly with a view to the requirements of field service: 1st. Different kinds of forage; 2nd. Concentrated forage; 3rd. Compressed forage.

1st. Different Kinds of Forage.

The usual food of horses in this country, and over the greater part of Europe, is oats and hay, with sometimes a certain proportion of straw. In some parts of Spain, as well as in North Africa and Asia Minor, the grain given is usually barley, with chopped or broken straw. In South Africa and America, maize is largely used, with hay and straw. In India, gram and cooltee are the principal grains, and freshly gathered grass is chiefly used instead of hay and straw.

For the present, we will consider oats, hay, and straw as constituting the classical forage ration of army horses in Europe; other articles being substituted only in special circumstances, when the supply of these is too expensive, inadequate, or altogether fails. It must be remarked, however, in speaking of these substitutes, and especially with regard to grain, that they can rarely be resorted to suddenly. The horse appears to be peculiarly impressionable to abrupt changes from one kind of food to another—more so, perhaps, than any other of the domesticated animals; and this must be seriously taken into account in considering the question of forage for army use. This impressionability is related not only to the horse's physiological constitution, but also to his natural fastidiousness and delicacy of taste. He requires a long time to become reconciled to some kinds of food, no matter how suited they may be to his organization; and when a strange forage is put before a number of horses, it is curious to note the different ways in which individuals will take to it. Some will eat it without hesitation, others after a day or two, others will eat it sparingly and never take to it kindly; while some others, again, will not even try it, and will sink from hunger exhaustion with the food lying before them.

Physiologically, sudden changes from one forage to another are often productive of very serious consequences, and many instances of grave damage to troop horses from this cause might be mentioned. I need, however, only allude to the great mortality which occurred among the horses of our mounted corps, immediately after the Battle of Waterloo, when the Allied Armies were advancing on Paris, due to the horses being fed chiefly on growing wheat, for lack of other forage; and also to the heavy damage done to our army horses in the Crimea, when they were given barley instead of oats, the supply of the latter having failed. Injury of this kind is more or less related to the digestibility of the food, a matter of importance in regard to this subject.

In Oats we have, undoubtedly, the best of all the grain foods for horses, as they contain, in a concentrated form, all the elements necessary for supplying waste of tissue, and especially that of the muscles; while they are, as a rule, easily digested. For horses performing hard work, there is no grain equal to them, though it must be admitted that horses can undergo severe exertion on other kinds of grain, such as barley and maize.

The nutritive value of oats is about equal to that of hay, though owing to their more ready digestibility and relatively small bulk, they

are preferable to it when time, transport, and capacity are of moment. And besides their value as an aliment, it would appear that oats contain that which has not yet been found in any grain food given to horses, in the form of a stimulating principle which, acting upon the nervous system of horses, gives them more energy and stamina while developing their muscular powers, and has altogether a favourable influence on their condition when they are taxed by work. M. Sanson has discovered this principle in the husk, and having isolated it, has experimented with it upon horses. To this may be attributed the superiority of oats over barley, maize, and other grain, in sustaining horses for long periods of severe exertion, when stimulation, as well as pabulum, is needed.

In judging of oats for food, it is well to remember the characters by which good may be differentiated from bad oats. In the first place, each grain consists of two parts, husk and kernel, the latter possessing considerable alimentary value, and the former scarcely any at all; so that oats which contain the largest proportion of kernel are those which are most serviceable to the horse. The relative proportions of kernel and husk vary considerably in different kinds of oats; in some samples the husk forms as much as 35 and 40 per cent. of the oats, while in good grain it may be as low as 20 per cent. It is of importance sometimes to estimate the feeding value of oats, and this can readily be done by separating the kernel from the husk by hand in a number of seeds, and weighing each. This gives a better and a more practical indication than is afforded by the external appearance of the oats, their colour, or their weight collectively. It may be noted that oats which have the smallest proportion of husk are those which are most readily and thoroughly digested, and that crushed oats are more quickly and perfectly digested than when they are whole.

The weight of oats is not altogether a trustworthy index to their nutritive value, though it is that which is generally adopted; the thickness of husk and its separation from the kernel, as well as the dryness of the grain, will influence its density. M. Grandeau compared many samples of oats, and found a rather wide diversity between them, with regard to their natural weight and nutritive value. Thus, in different samples of oats, all weighing 57 kilogrammes to the hectolitre ($125\frac{1}{2}$ lbs. to $2\frac{3}{4}$ bushels), he ascertained that the nitrogenous matter was 8.19, 8.71, 9.74, 9.50, and 10.42 per cent., demonstrating that there is not a fixed relation between the richness in the useful elements in oats, and their density or weight.

It is also to be observed that the oats grown in various countries differ much in quality, in nutritive value, and in digestibility.

There can scarcely be a doubt that the contract weight (38 lbs.) per bushel of oats for army horses is too low, and especially when we know that they are chiefly obtained from Sweden and Russia, where the quality of this grain, and particularly the Swedish, is rather inferior. At least 40 lbs. to the bushel should be made the minimum standard; and it is needless to add that they should possess all the characters of sound and clean oats. Musty oats are particularly dangerous and instances

are innumerable of the damage done to horses by feeding them on such grain. One notable instance is recorded of such injury being inflicted on troop horses, in the case of the 12th Lancers. That regiment formed part of the British Army which occupied France for three years after the Battle of Waterloo, and the horses were fed chiefly on oats which had become heated and musty in the stores, where they had been collected in large quantities.

Other kinds of grain food are sometimes substituted, wholly or partially, for oats, according to circumstances, but, as I have said, they cannot be recognized as equal to them. Maize approaches them closely, and forms the chief, often the only grain food of horses in several parts of the world. In South Africa, our troop horses have been fed upon it and performed good service; and during the French expedition to Mexico, the horses and mules sent from France received no other grain and did well upon it. In the United States of America and in Mexico it is the staple food of working horses, and in Europe it is now largely used, being even grown in some parts. General Rosenberg introduced it into the ration of the horses in the Prussian Army some years ago; and in Spain, Portugal, Italy, Hungary, and the Rhine Provinces, it has long been recognized as well adapted for horses performing hard work. It is very digestible and economical, and may replace one-third, two-thirds, or even the entire ration of oats, weight for weight, if the seeds are broken previously. In South Africa the maize is given in stalk to the horses, these stalks and heads being known as "mealies."

Barley, as already mentioned, is rarely used in this country as food for horses; in France and Italy it is only given in the South. In the East it is almost the only grain allowed, not so much perhaps because it is preferred to oats, as because these cannot be grown in warm countries. In Spain, barley and chopped straw constitute the only forage, and the horses thrive well on it. In 1823, when the French Army entered that country, the cavalry and artillery horses soon became accustomed to it, and no ill effects were observed.

Rye is not a desirable food for army horses, and the same may be said of Wheat. Millet is sometimes given to horses, especially in Southern Russia, where it grows abundantly; and, as jawaree, it is used for the same purpose in some parts of India and in North China. It is said that the Belooch mares in the Western Punjab receive scarcely any other grain, and they perform the severest marches on it.

Bran enters more or less into the ration of troop horses, especially on ship-board, where it is very useful. In the infirmary stables, for sick horses it is most valuable. The chief drawback to its use in the field hitherto has been its great bulk, inflammability, and tendency to become sour and mouldy in a short time, if exposed to damp. All this is entirely obviated by compressing it into large dense cakes, which are almost weather and fire-proof, contain a great quantity in a small bulk, and are easily transported.

Of the pulses, the most important is undoubtedly Beans, which should form a portion of the grain ration of all horses performing very

long and severe labour, as they are a very stimulating and nourishing food. But beans require careful inspection, as they are so often unsound and infested by parasites. They should be split or cracked before they are given to horses.

Peas rarely enter into the ration of the troop horse in Europe, probably because of their being rather indigestible; though Gram, a kind of pea, is largely employed in India.

Other grains are sometimes given to horses, but so seldom as not to merit consideration here.

The different grasses furnish a very large proportion of the food of horses, and are more or less valuable according to their botanical order and condition. They are described as natural and artificial; the natural ones being true grasses, and the artificial not so, as they contain the clovers, lucerne, sainfoin, and others of a like character, and which are rarely given to army horses.

The natural grasses are those best adapted for horses performing fast work, as they are less bulky and more easily digested. They are not given in the green state in Europe, unless occasionally in small quantity, as they contain too much water, and are unsuitable for working horses. When properly dried, however, in the form of Hay, they constitute an essential portion of the daily ration, and one-third of their weight in this state is more than equivalent, in nutritive value, to the full allowance in the green or undried condition. Hay varies considerably in feeding value, according to not only the grasses which enter into its composition, but also according to the situation, the soil, the districts, and even the countries in which it is grown; and also to the manner in which it is preserved or made.

It would be out of place here to describe the different kinds of hay and the characteristics of good hay, as they should be familiar to all who have to do with the provisioning or feeding of horses.

Suffice it to state, that hay should always be of recognized good quality, both of growth and preservation. It is the natural food upon which horses can live all the year round without any grain, so long as they are not doing any or much work; as it maintains the temperature and the vital functions when no unusual demand is made upon them. But to supply the waste of the body caused by work, an abnormal quantity of hay would have to be consumed, and this would prove injurious. On the other hand, horses cannot live on grain alone. Experiments have demonstrated that after a week or ten days' feeding on good oats only, they gradually eat less, become dull and heavy, lose weight and condition, and are evidently sick of the too stimulating and concentrated food.

Much discussion has arisen as to whether it is best to give the hay long or cut. When given uncut, there is no doubt that much of it is wasted, and a considerable time is consumed in masticating it. Persons who employ a large number of horses find it more economical to have the hay chopped and mixed with the grain; and for army horses, and especially when on picket lines, chopped hay would prove a great boon, as the loss in the daily allowance is considerable, particularly if the weather be wet or windy. But the difficulty in obtaining it pre-

pared in this way during peace-time is an obstacle, and in the field it could not well be fed to the horses unless a different kind of feeding-or nose-bag were provided.

I shall recur to this point, however, in a few minutes; merely remarking that the bulkiness of hay, and especially if it be long, is a great drawback to its use on active service. It requires much transport, is easily damaged by wet, is very inflammable, and is troublesome to issue. It is a terrible encumbrance to the cavalry soldier when it has to be carried loose in the regulation hay-net. I know of nothing which can prove more worrying and hampering to cavalry in a charge, in passing through a thickly wooded or scrub-covered country, or in crossing streams or rivers, or even in wet weather, than hay-nets distended with hay. These should be abolished.

With regard to straw I have but little to say, as it does not enter into the food ration of our army horses, and is only allowed as litter. Though horses are sometimes partial to it, yet it contains very little nutriment, and it is too bulky and indigestible for horses performing hard or fast work. A small proportion, if sweet and chopped, gives bulk to the feed, and causes the horse to masticate his oats. For this purpose oat straw is preferable to any other. The difficulty attending the transport of straw prohibits its use in the field, where it certainly can be dispensed with.

2nd. Concentrated Forage.

At various times attempts have been made to feed horses upon specially prepared foods, with the view of presenting nutriment in a concentrated and more readily assimilable form, and also, for armies, with a view to portability in addition.

In books on the training of horses published during the last century, directions are given for the production of what was called "horse bread;" and during this century, experiments have been numerous with various kinds of artificial and specially prepared foods for horses, more particularly for those employed during war.

I have already remarked that horses are extremely dainty in their food, and even in the matter of grass and grain to which they are unaccustomed, they will often prefer starvation to eating it. To animal food, especially, they have a particular objection, and the slightest trace of it in their ordinary forage will sometimes cause them to reject it. Their sense of smell is more acute than that of taste, though that is also highly developed. Yet, notwithstanding this delicacy of taste, horses will in time get over their prejudices, and eat what is otherwise very foreign to their nature and habits. In Iceland, for instance, the horses have no scruples at all in eating fish.

Not long ago, M. Müntz introduced a forage biscuit, composed of blood and crushed oats and maize. The mixture was kneaded, cut up into cakes, and cooked in an oven or simply dried in a stove. When fresh these cakes had an agreeable odour, and it is reported that horses ate them with avidity. If such food could be introduced, from its high

nutritive standard it should, to a certain extent, advantageously take the place of ordinary forage, as the slaughter-houses could furnish a large supply of blood. But several conditions would have to be observed: the blood must be perfectly fresh and healthy, the biscuits should be well dried or baked, and they must be kept from damp. Otherwise, putrefaction will rapidly ensue.

During the investment of Metz by the Germans in 1870, attempts were made in the French Army to feed a certain number of horses on the flesh of those which had died or been killed. Veferinary-Surgeon Laguerrière, who made the experiments, reports that:—

1. The flesh of any animal can be used as food for horses.
2. The repugnance of horses for flesh is not nearly so great as is generally believed; for by proper preparation of the flesh, and by diminishing the ordinary ration, or even withholding it altogether at one or two feeding times, horses rapidly become accustomed to it.
3. Horses digest perfectly raw or cooked flesh, even more quickly and completely than they digest vegetable substances.
4. On flesh, horses thrive, fatten, and increase in vigour and energy, if it be given in addition to the daily ration, or even if it largely takes the place of the usual forage.
5. Raw flesh may be given to a certain number of horses, but it is preferable to boil it well; the water in which it has been boiled may be given them to drink.
6. Whether raw or boiled, the flesh should be finely cut up or hashed, then triturated and mixed with vegetable substances more or less alimentary, as leaves of trees, straw, hay, meal, grains, roots, &c., and, if possible, common salt added.
7. The flesh should be given in small quantities at first, gradually increasing the allowance. As much as $4\frac{1}{2}$ to $6\frac{1}{2}$ lbs. per diem have been given to each horse, flesh being then almost exclusively the daily food.
8. Certain horses readily took the mixture from the hand, others ate it from the nosebag, while others again preferred it from the ground or in the manger.
9. Several horses ate the morsels of raw flesh with only bran, meal, or grains sprinkled over them, or ate them when placed between leaves; afterwards these animals took them without any preparation whatever.
10. If the horses absolutely refuse this animal food, it is easy to overcome their repugnance by drying the cooked flesh, reducing it to a powder, and making it into a bread prepared with any vegetable substance.

More recently, and with a view to feeding army horses on active service with a highly nutritious food in small bulk, Scheurer-Kestner introduced a meat biscuit, in which the inferior flesh of cattle was utilized. When made with oatmeal, or barley- or maize-meal, to which one-third of flesh was added, the fermentation during baking dissolved the latter, and thus the vegetable ingredients were endowed with great reparative properties. This biscuit was reported as capable of being kept for several years without being damaged.

In England a similar biscuit has been tried with reported success by a Mr. Dünkelberg; and Spratt's dog biscuit, which contains a certain proportion of flesh, has been given to horses, which were said to eat it readily. It is stated that the Desert Arabs have for a long time been accustomed to give their horses a meat biscuit or bread on certain occasions, when great exertion is required from them. Not long ago an experiment was made with a kind of bread or biscuit composed of crushed oats and the refuse of flesh left from the preparation of Liebig's extract of meat; with this the horses of a cavalry regiment stationed at Deutz, Germany, were fed for some time, and the result was so satisfactory that the German Minister for War had a large quantity made at Mainz for a more extensive trial.

Bread or biscuit, composed entirely of vegetable matter, has been used for a long time in Sweden, Germany, Belgium, and Holland, and has often been tried in this country. Its use for army horses has frequently been put to a serious and extensive test. Owing to the difficulties attending the transport of forage in the field, the subject had for many years attracted the attention of military nations; but it was not until the Franco-German War of 1870-71 that attempts were made to decide the question of its utility. During that momentous event, it was found that, notwithstanding the good organization of the German Intendance, the supply of forage, even in such a country as France—so full of resources of every kind, and with such ready facilities for moving them from one part to another—was often interrupted and precarious, especially for the cavalry. This was mainly owing to the new fashion introduced of employing that arm in widely scattered and far advanced detachments, to screen the advance of the slower moving troops, to act as scouts, and to keep touch with the enemy, instead of marching in masses close to their supplies, which were carried by the transport.

And even after the campaign was terminated, the difficulty was still present to the troops left to occupy the French provinces. There was very little forage of any kind left in the zone of territory occupied by them, and it was not an easy task to transport it from the neighbouring provinces. It was indeed with the greatest effort that a permanent supply of hay was procured for the horses of the Headquarter Staff. The German Treasury, moreover, suffered great losses in oats, partly on account of constant damage and deterioration to which this kind of forage is liable in transport, and partly also on account of the very high price that had to be given for this grain when supplies had to be purchased for the Army.

So urgent did the matter appear to the military authorities, that the Commander-in-Chief of the army of occupation, Field-Marshal Manteuffel, and the Intendant of the Army, Herr Englehardt, were, in 1872, induced to appoint a Special Commission to make trials of various sorts of condensed forage, prepared by Herr Warnecke, in a large and most complete laboratory established by the German Government at Nancy, for the supply of preserved provisions for the troops. This compressed forage took the form of biscuits (*Pferdekuchen*), prepared with the meal of various grains in certain propor-

tions. There were three kinds of biscuit, designated as 1, 2, and 3. They were composed as follows:—

No. 1.		No. 2.	
	Per cent.		Per cent.
Oatmeal	60	Oatmeal	40
Rye-meal	30	Dextrinated pea-flour ..	40
Ground linseed	10	Ground linseed	20

No. 3.	
	Per cent.
Dextrinated pea-flour	20
Wheaten flour	20
Ground Indian corn	20
Rye-meal	20
Bread-waste	10
Ground linseed	10

A small proportion of salt was added.

The ration of biscuit varied, but it was estimated that about 4 lbs. were equivalent to 11 lbs. of oats, and that 6 lbs. per diem would enable a horse to undergo extraordinary fatigue, even if not supplemented by any other forage. Each biscuit was 4 inches in diameter, and the 4 lb. ration occupied a space that width, by 15 inches in length. They were either strung on a wire or carried in a canvas bag for conveyance on the saddle, and when given to the horse were broken in pieces, and eaten either dry or after being soaked in water.

The trials of these biscuits were begun by the cavalry of the German Army of occupation in 1872, on an extensive scale, and prolonged for ten months without interruption. One hundred horses were experimented upon on each occasion for ten days; fifty were fed with hay and oats as usual, the other fifty being fed solely on the biscuits, which had been manufactured a year. The result of these trials was reported as most satisfactory, inasmuch as the horses fed with the biscuits were, during the whole period, full of vigour and spirit; and while the trial lasted the average number of sick horses was 75 per cent. less than with those foraged in the usual way. A large Committee of Officers, among whom were the chief veterinary surgeons, decided in 1873 that these forage biscuits were excellent, and that they answered the requirements perfectly. Such distinguished chemists as Liebig and Fresenius also gave their opinion in favour of this concentrated forage, and asserted that it entirely fulfilled all necessary conditions.

Other trials were made with this biscuit, and in the end the results were deemed so satisfactory and so conclusive, that it was decided to build, with the remains of the war indemnity placed at the disposal of General Manteuffel, three factories for making them (and also preserved rations for the soldiers), at Mainz, Berlin, and Ratisbon, and on such a scale that in the event of war they could

manufacture many thousands of rations daily of this forage; at Mainz alone, 19,000 rations could be made per day.

The success of these experiments in the German Army induced the Russian military authorities to institute trials of forage biscuit in some of the Guards cavalry corps, and also in the cavalry of the Odessa and some other commands. Those in the Guards cavalry were carried out on the same principle as those in the German cavalry. A certain number of horses were selected, and for the first twenty-five days they received 4 lbs. biscuit and 10 lbs. hay. Then $\frac{3}{8}$ lb. biscuit was added, and 2 lbs. less hay allowed until the thirtieth day, when the horses received nothing but 6 lbs. biscuit per diem for several days. At the termination of this trial, the vigour and general condition of the animals was found to be equal to that of the horses fed on the ordinary ration. The experiments in the other corps were equally satisfactory, and the consequence was that the Russian Government followed the example of the German Government, and in 1877 established a biscuit factory at St. Petersburg, at Moscow, and at Ekaterinoslaw. That at St. Petersburg can turn out nearly two tons of biscuit a day. The composition of the Russian biscuit was, in 1879, as follows:—

		Per cent.
Oatmeal	from	35 to 40
Rye-meal	„	25 „ 30
Pea-meal	„	15 „ 20
Linseed-meal	„	9 „ 10
Common salt	„	1½ „ —

During the Russo-Turkish War, when no fewer than 20,000,000 rations of this biscuit were consumed in the Russian Army, its composition was:—

		Per cent.
Oatmeal	from	30 to 40
Pea-meal	„	30 „ 50
Barley-meal	„	10 „ 20
Linseed-meal	„	15 „ 20
Common salt	„	1 „ 5

The factory at St. Petersburg, during the war, furnished 20,000 rations daily, and had at the end of September, 1887, despatched more than 500,000 rations for the use of the active army.

Each biscuit was $3\frac{1}{2}$ inches in diameter and $\frac{3}{4}$ inch thick. They were strung on a wire or string, which passed through a hole in their middle, and by it were attached to the saddle. During the passage of the Balkans and the subsequent advance into the neighbourhood of Constantinople, all the horses of the cavalry and artillery of the Russian Guard were fed entirely upon the biscuit for twenty-six days, and are reported to have kept in excellent condition all the time, although hard worked and exposed to inclement weather. The only disadvantage found in their use was that the soldiers stole them to eat. The Germans prevented this by adding 5 per cent. lupine seed. A horse could carry two to five days' rations, and the biscuits

were given either wet or dry, but always broken; the horses were fed on them three times a-day, at 7 A.M., noon, and at 7 P.M.

The German biscuit was tried in the Austrian Army, but the result was unfavourable.

France has, on several occasions, made trials of forage biscuits, notably those proposed by Army Veterinary Surgeon Naudin and M. Barthe. These biscuits were tried in France in 1878, and with the cavalry in Tunisia more recently; but the results do not appear to have been sufficiently satisfactory to induce the French Government to adopt this kind of forage.

The Italian Government, in 1878, instituted experiments at Salerno, with a similar biscuit introduced by Colonel Ravelli, the experiments being carried out on cavalry horses, sixty-four in number, for a month. Thirty-two of these were fed on the biscuit only, sixteen on it and hay, and sixteen on it and oats. The first received nearly 11 lbs. of biscuit per diem, the second $3\frac{1}{4}$ lbs., and the third 3 lbs. 2 ozs. The last two consumed, in addition, the first, 11 lbs. of hay, their usual ration; the other 7 lbs., their oat ration. In the early days of the experiment, the precaution was taken to soften the biscuits in water, so that they might be more easily eaten by the horses. Some did not take to them well, and two or three of the Maremma breed absolutely refused them. In the third, fourth, and fifth days, some of the horses fed on the damped biscuits only, showed signs of gastric disturbance; when fed on dry biscuits they all recovered. Those on the mixed food, with two or three exceptions, did not show any signs of indigestion during the month, and preserved their vigour; though they looked rather empty, as did the others. The conclusion was favourable to the use of biscuits, and it was recommended that in camp and during war the ration should be increased to 13·2 lbs., and also that they should be given to the horses during peace, in order to accustom them to this food.

The great importance of the subject of quality and transport of forage has not escaped the attention of our own Government, but, on the contrary, has received much notice from it since the Russian War of 1854-55. For the war in North China in 1860, and also for that in New Zealand in 1863, and in Abyssinia in 1867, compressed hay mixed with oats was sent as forage, and was reported upon as a great improvement on the ordinary forage, though objectionable in some respects; for instance, waste of grain in issuing the forage, and the drawback in having the hay and oats together when only one of them was wanted; as well as the defect, that one could not be increased without also increasing the other.

The experiments on the Continent, and particularly the success attending those in the German and Russian Armies, appear to have led to an earnest desire to perfect our system of foraging horses on active service; and a Committee was therefore appointed in 1878, to make inquiries into the various kinds of compressed forage used in foreign armies, or manufactured in this country, with a view to the best being adopted for the British Service. Such forage was to fulfil the requirements of field operations, in being—

1. Portable, both for carriage by land transport and on board ship.

2. Possessed of good keeping qualities.

3. Retaining the maximum of nutritive properties after the process of compressing has been carried out.

4. Being of a nature admitting of horses changing to or from their ordinary food, without avoidable risk.

Having been appointed a member of the Committee, which continued its investigations for three years, I can testify to the anxious care with which its investigations were conducted, and the caution exercised in arriving at conclusions. A large number of samples of forage of different kinds were submitted and examined, and among them various sorts of horse biscuits and compressed hay and grain. Of the biscuits, Barthe's, composed of oatmeal, pea-flour, rye-flour, and linseed meal, and which had been tried in the French Army and unfavourably reported upon, was not accepted for trial; but Spratt's biscuit, made up of wheat, oats, beans, maize, dates, and other ingredients, and the German Army biscuit (known as Warnecke's), the composition of which I have already given, were experimented with. Spratt's biscuit was tried in 1878 on horses of the Army Service Corps and 16th Lancers, and found unsuitable.

In view of the favourable reports published in Germany and Russia, the German biscuit was submitted to rather prolonged and extensive trials at Aldershot, Woolwich, and London, in 1879, on cavalry, horse artillery, and Army Service Corps horses, but the results were generally unsatisfactory. Experiments also made with a biscuit supplied by Colonel Trench (20th Hussars) were no more successful, and the Committee came to the conclusion that "cooked food in the form of biscuits is unsuitable for the horse's ration," because (1) of its too rapid assimilation, and, when given alone, of its insufficient bulk; (2) horses do not take it readily—some horses persistently refused to eat it during the seven days' trial; (3) it might find its way into the camp kettle; (4) its great expense, 18*l.* to 28*l.* per ton; (5) difficulty in carrying it; (6) tendency to produce internal derangement.

3rd. *Compressed Forage.*

The opinion of the Committee was well founded, and the first and last reasons given for rejecting this biscuit forage were quite sufficient, in themselves, to justify their decision. Horses will not perform hard work on cooked food, it would appear, and their ration must possess a certain bulk. Their anatomy and physiology are such that though they only eat a small quantity at a time in a natural state, yet they should be fed frequently, and their food should produce such a feeling of repletion by its volume as to satisfy the appetite.

The essence of a large ration might be given in a very minute quantity, yet hunger would not be appeased, and the animal would lose condition. Therefore it is not so much to concentration of the nutritive

properties of forage for army purposes that we should look, as to compression of the ordinary forage, and in such a way as to make it as portable and conservable as possible. Panification of the food will not answer, and especially for horses exposed to weather, and which have to undergo severe fatigue. Compression, after suitable preparation of the ordinary forage, was then decided upon by the Committee, for experiment. What was known as "Davis' Compressed Forage," consisting of bales of hay and oats mixed, had been already tried in North China, Abyssinia, New Zealand, and South Africa; its only advantage was reduction in bulk, a ton measuring from 55 to 70 cubic feet. Its disadvantages I have alluded to. It was sought to effect a still further reduction in bulk by having the grain and hay compressed separately in smaller quantities, and in a form better adapted for distribution and digestion. The great improvement in compressing machinery, and in the art of compressing, which had taken place, rendered this an easy matter.

A "grain cake," as it was termed, was introduced by Captain (now Lieutenant-Colonel) Graves, 20th Hussars, and this appeared to be the most desirable form in which the grain food should be presented. But the Graves' cake was composed of crushed maize, oats, beans, and so many other ingredients of uncertain nutritive value, and so different to the ordinary forage, that the Committee decided to reduce the number of constituents, and to have a compressed grain forage of simpler and more reliable composition. A cake was accordingly prepared, per ration, as follows:—

Oats, crushed	7.25
Beans ,,	1.00
Linseed ,,	0.25
Hay, chopped	0.50

This grain cake was intended to replace the ordinary oat ration; and from its composition, and the fact of the grain being crushed, it was thought that 9 lbs. of it would be equivalent to 12 lbs. of uncrushed oats. Long-continued, extensive, and thorough experiments were made with it in the cavalry, artillery, and Army Service Corps, in stables and on picket lines, and with the most satisfactory results. After being fed for a month on a ration of 9 lbs. of the cake and 8 lbs. of hay per diem, the horses looked well, though in some instances undergoing severe work. It was considered, however, that, for the heavier horses especially, the allowance was rather small, and particularly in camp. The grain appeared to be thoroughly masticated and easily digested—an important point when considering the condition of tired or old horses, or when time is scanty. With regard to diminution of bulk, this was also found to be fully achieved. One ton of the cake occupies 38 to 40 cubic feet, while a ton of oats requires 80 to 100 cubic feet; the reduction which can be effected in the ration (say 1 lb. per diem) is also an important feature in connection with transport. The composition of the cake is also such as

should meet all the requirements of a typical grain food for hard-working horses, and is a great improvement upon the oat ration.

For facility of transport and issue, the crushed grain was made into rectangular cakes weighing 18 lbs. each—a day's ration for two horses; four or five of these being made up into a small bale, securely bound.

The keeping qualities of the cake were found to be good; it was sent to different parts of the world, kept there for a considerable time, then returned to England and examined, when it was found to have undergone little, if any, change.

In the words of the Committee's Report: "Horses thrive on it, take to it readily, and change to and from it, with reference to their ordinary forage, without detriment to health or condition."

In their inquiry, the Committee were not unmindful of that other essential portion of horse's food—the hay. The difficulties attending its provision, storage, and transport in the field; its inflammability, and its great tendency to become mouldy and otherwise damaged when exposed to wet and other influences; and the great loss sustained in issuing it and feeding it on the ground to horses; induced them to try chopped hay compressed into dense cakes, like those of grain, and of the same weight. The result was again perfectly satisfactory. When hay is cut into short lengths—about $\frac{3}{4}$ of an inch—and pressed into cakes of this description, it forms not only a most convenient and very portable article of forage, so far as transport and issue are concerned, but its keeping qualities are greatly increased, while it is almost unflammable, and is nearly waterproof. The saving in cubic space alone is something extraordinary; for while one ton of the ordinary compressed hay in iron bands occupies 135 cubic feet, one ton of the hay cake measures only 45 cubic feet. It was estimated—and the estimate was found, on experiment, to be correct—that 9 lbs. of hay cake (two rations in each cake) were equal to 12 lbs. of long hay; so that the amount of cubic space required for one horse's ration of the latter would contain four rations of hay cake. When this chopped hay is given to horses in suitable nose-bags, there is no waste whatever; very different is it with long hay thrown on the ground before the horses in wet or windy weather. Mastication, too, is much easier, and there is not the risk of horses swallowing soil, gravel, and other injurious matters as when they are fed on the ground. On the line of march, also, the immense inconvenience of carrying voluminous hay-nets suspended from the saddle is avoided.

By having the hay and grain separate, several important objects are attained. The horses can have a larger or smaller allowance of each; if hay or grass can be procured within the zone of operations, then the hay cake need not be given. As the result of experiments at Aldershot, there is reason to believe that a force might be detached on a reconnaissance for four days, each trooper carrying four days' rations of grain cake (36 lbs.) in the nose-bag, supplementing this with whatever hay, grass, or straw might be obtained on the line of march; while an additional two days' supply might easily be carried

in the squadron carts of regiments, and on the ammunition wagons of the artillery.

When horses are fed with the hay and grain cake, these should be mixed in each feed, as it saves time and is more economical. To do this, however, a larger nose-bag is required; and one was devised by the Committee which answers the purpose admirably. As is well known, the present nose-bag is of very little use. It is so small as only to hold one feed of oats; is soon worn out by the ground (during the Zulu campaign the average wear of the nose-bags was a fortnight); owing to the horse tossing up his head to get the oats in his mouth, much is wasted; and the weight is entirely supported by the horse's head. The improved bag is sufficiently large to hold a full feed of grain and hay cake, or three days' rations of the former. When worn by the horse it is horizontal, instead of vertical as with the present bag, and the weight is borne by the head and body. The bag never comes in contact with the ground, and therefore the amount of wear is so much diminished that it should last for a very long time. The comfort of the horse when feeding is very much increased—as he eats from the upper side of it; there is no fouling by the breath; nor is there any waste of forage, while the animal can breathe quite freely. By means of the cords attached to each bottom corner of the bag, and which serve to suspend it to the body, when it is filled with grain cake to be carried on short expeditions, it can be lashed to the saddle. This bag was also tried in the Aldershot experiments of 1880, and reported on most favourably by the different regiments.

I have alluded to the use of bran on shipboard and in the field, and to the trouble and risk there is usually experienced in carrying and preserving it. When compressed into cakes, like the grain and hay, the trouble and risk are at once got rid of. It is easily carried, and if not exposed to much damp will keep for a very long time. One of the cakes of bran now before you, weighing 25 lbs. and containing two bushels, has been compressed for more than twelve months. I may mention that one ton of bran in sacks occupies 150 cubic feet, but when compressed into cakes it requires only 40 cubic feet, being a saving of 110 cubic feet per ton.

In every way this compressed forage has answered well, and has met all the requirements of an army forage. It is very portable, keeps well, is easy of issue, does not waste if properly given, is readily masticated and easily digested, contains the nutriment in a sufficiently concentrated form, while it possesses the necessary amount of bulk to prevent horses feeling dissatisfied when they are fed; it is not very combustible; and it consists of the ordinary food of our horses.

As I have said, these cakes are made up into small bales, containing four or five cakes, covered with canvas and bound by light iron bands, and are well adapted for either wagon or pack-saddle carriage. They appear to be damp-proof, and are certainly bullet-proof.

In addition to the extensive trials made of this forage at home, it has undergone satisfactory tests in Egypt and the Soudan, and also in India. In India the forage biscuit was tried in 1881, and failed;

whereas the hay and grain cakes answered well, forming an excellent forage, and their keeping qualities were found to be good—a year's test having been imposed. I understand that the Indian Government contemplates preparing large quantities to be kept in reserve, and it is reported that the French Government look with favour upon this kind of forage, and are about to lay in large quantities of it. Considering this the best kind of forage for military purposes—that is, for field service, it may be hoped that there are means in this country by which it could be readily supplied when needed. The machinery to prepare it cannot be extemporized in a few days, and if it is to be supplied by private firms, some demand for it must exist all the year round, for the reason that there would be no demand for it except for army purposes. The system of securing supplies of this kind for the Army rather militates against the adoption of the compressed forage, as the tendency is towards extreme economy during peace, and extravagant expenditure in war-time.

In order to accustom the Commissariat Corps and the horses to this war forage, and manner of using it, as well as to encourage manufacturers of it, a certain quantity should be used annually—say, not less than 1,000 tons—and a day's ration given to every troop horse once a fortnight, or even once a month; a stock to the same amount being always kept on hand for emergencies. I am strongly of opinion that everything done with, and for, men and horses during peace, should be in the nature of a rehearsal for war; so that there should be no confusion, dislocation, nor defection when troops have to take the field.

Before a manufacturer of this forage can turn out, say, from one to two hundred tons a week, he must spend a large amount of money in laying down machinery, and if this be not regularly employed, there is not only the loss of interest on the capital, but the machinery itself soon becomes damaged. Therefore, unless we are to find ourselves in an unpleasant fix with regard to forage should a war occur, we should not only have a good reserve supply on hand, in order to avoid having to pay a most exorbitant price if an emergency arises, but there should also be provision made for a constant supply to meet all demands of active service.

I should have liked to have referred at length to the supply of forage to army horses during peace, but time will not admit of my doing more than briefly noticing it. Those who, like myself, have given the subject some attention, must have come to the conclusion that the present system is unsatisfactory in several respects, and that probably much improvement could be effected, and a large money saving made, if army horses were foraged on the principle in operation in large civilian establishments of horses, such as the omnibus and tramway companies. Take, for instance, the London General Omnibus Company, which at two forage depôts prepares and delivers food for more than 10,000 horses. The objection which would probably be raised to such a system is, that it would be impossible to prepare forage in London and deliver it at a distant station, say, Aldershot, as cheaply as it would be to purchase unprepared

forage at that station. This objection might be met, however, by pointing out that such places as London, Liverpool, and Hull are the great centres for forage of all kinds, and its price everywhere else is governed by its price at these markets. For example, supposing a quarter of oats in London costs 15s., and the railway carriage to Aldershot is 1s., the market price at that place would be at least 16s. 6d. or 17s. per quarter, the extra amount being the merchant or contractor's profit.

Then again, buying in large quantities, as the Government would do, the supplies would be procured direct from the grain ships, and thus the factor's and merchant's profits would be saved.

The same argument would apply to the procuring of hay. The growers would be only too pleased to submit their samples, and, if approved, sell direct to Government as a consumer, at a price as low, if not lower, than to the hay dealers in whose hands they must place themselves, often not knowing how or when they will receive payment.

One other objection may possibly be raised, viz., that it would be detrimental to the English farmer if the Government were to purchase supplies in, say, the London market. But a simple answer to this would be, that under the present system Government buys from the contractor, who, in his turn, purchases from the London merchants. Foreign oats (the present contract prices are so low that none but the cheapest Russian oats can be purchased), or even those of home growth, the Government could buy direct, as the price suited. The advantage to the public and the horses would, I am certain, be very great, and we should get rid of bad forage, speculation, light weight, and all the other evils which cause so much trouble and dissatisfaction. As regards delivery of forage from the railways to the barracks, there should be no difficulty about this, as cavalry, artillery, and infantry have their horses and wagons.

I regret that time will not permit me to refer to the quantity of forage allowed to army horses,¹ a subject of much importance, and which is well worthy of discussion; but I must forbear, and, in conclusion, ask you to aid in throwing as much light as possible on the different points I have been, by your kindness, allowed to touch upon in this paper, in order that our Army may benefit to the largest extent from your experience and observation.

Colonel E. A. WOOD: We are very much indebted, as every Officer in the Army must be, especially those in the mounted branches, for the excellent lecture we have heard from Dr. Fleming. I regret, however, that he did not bring forward the results of some experiments made at Aldershot some few months ago, in 1887. In these experiments several kinds of compressed forage were tried, and not only tried one against the other, but they were tried against an increased allowance of 2 lbs. extra corn. I think those experiments should have been mentioned. I cannot say for certain whether the forage that Dr. Fleming has been describing—the oat-cake and the hay-cake—was tried there, but fancy that it was, anyhow there was forage of that description, and I imagine every kind of forage best known to the authorities was tried. The one which then answered decidedly best before all others was the desiccated forage prepared by Mr. Goode. We had not much opportunity of testing that with regard to its advantage over the other forages, until we removed all the bedding

¹ This will form the subject of a further lecture by Dr. Fleming.—ED.

from the horses, and there we found a tremendous improvement. This Goode's forage, a kind of compressed forage, left all the others far behind, and that I believe is what the Committee reported as being the best in preference to all others that were tried. I should like to have had some allusion made to that. Perhaps Dr. Fleming would be aware of it, and there may be some other Officers present who were at Aldershot when it was tried. I do not think we can be sufficiently grateful to Dr. Fleming for having brought these matters forward, but I am sure at present we are totally deficient in the large quantity of forage that we should require if we had to send an army corps abroad.

Colonel R. S. LIDDELL: Dr. Fleming, in speaking about the compressed or desiccated food, did not mention one point that occurred to me in carrying out those experiments at Aldershot that Colonel Wood has alluded to, and it would be very valuable if he would, later on, say something on that subject. That is with regard to one slight objection to compressed food. Of course we must have compressed food in our campaigns, it is certainly necessary in some shape or other, and all the armies are providing themselves with it, but the one difficulty we found at Aldershot was, it was impossible to know whether it was made of good material or bad. In examining ordinary forage as usually delivered, Commissariat Officers, Officers of regiments, and so forth, could discover at a glance whether the hay or the oats were good, but when forage is broken up and made into cakes there is very great difficulty. Of course, during these experiments at Aldershot, the people presenting these different kinds of food for test naturally send the very best. We had nothing to find fault with and the experiments were successful; but supposing a compressed food once adopted, we then have to consider how are we to know whether the ingredients are really of the best quality. The only way to get over it is, as far as I can see, that the Government should take the matter up in the same way as they did in the Navy where the biscuits for the sailors are made in the victualling yards. Why should we not have Government factories for forage? It is no use asking the Government to do anything which costs money, but I think Dr. Fleming might prove to the Government whether in the long run it would not be economy if forage was bought at the various large markets and then compressed in their own factories. I am sure that every regimental Officer, every Officer of a mounted branch will thank Dr. Fleming for his suggestions with regard to obtaining forage for the Army by any other means than those at present adopted, viz., from contractors. We know what difficulty we have in detecting the tricks that contractors resort to, and I am sure it would be a great advantage to Officers to have some such Government establishments as I have mentioned.

Colonel E. G. GRAVES (20th Hussars): I feel a certain amount of diffidence in standing up to speak on this subject as a layman, a subject introduced so well and so exhaustively discussed by the Principal Veterinary Surgeon of the Army, and I must say I think we are bound as a meeting to congratulate the Council of the Institution for having put this matter in the lecturer's hands. From his official position in the Army, and being also President of the Veterinary College, and largely responsible for one of our principal veterinary journals, he is in a position officially to obtain information as to what is going on abroad and in other armies, and is therefore able to base what he states in his lecture upon facts in a way that those of us who have no such official position would hardly be able to do. I say I think the Council is to be congratulated upon having put the subject into his hands on that account. I only venture any remarks here to-day, Sir, on the ground that I had, I may say, the good fortune to originate the principle of compression and heat in reference to the products which you have before you on the table. I am not the inventor of oats any more than of beans, or any combination of the commodities that are thus compressed, but before I submitted my invention to the authorities, I believe there was no attempt to produce a distinctly "corn-cake" of that particular dimension and character under those particular circumstances. Now, one thing I think that ought to be kept in mind clearly is this, that the question has been really a contest between "*concentration*" *per se* and "*compression*." All the experiments carried out in England showed, for the reasons given by the lecturer, that "*concentration*" was an utter failure. I believe the producers of those biscuits made on the principle of concentration, of which you have one in that small case, in attempting to apply them

for use amongst horses, failed lamentably in their anatomical knowledge. They seemed to think that the horse's digestion was carried out in the same way as any other animal's digestion, and that concentrated food would suit him as it would in many other animal cases, but it is not the fact. The horse's stomach happens to be in proportion to his bulk, his total mass, the smallest vessel of the kind known, I believe, in comparative anatomy. Again, the danger in using concentrated food of that sort lies in this point, that that particular biscuit and similar productions, when comminuted in the mouth and attacked by the gastric juice in the stomach are reduced in a short time by liquefaction to what would be practically the dimensions and consistence of a basin of pea soup. The result would be on service, that if a horse was watered irregularly and at irregular moments—(I am speaking now under the correction of the learned lecturer)—supposing that biscuit had been reduced to this state in his stomach and he was then watered, the whole contents of the stomach would be carried through the duodenum into the cæcum, the water stomach of the horse, and the result would be that the horse's main stomach would be left practically empty. Then, again, in the experiments carried out in concentration, we know in one instance in the year 1879, at Aldershot, that one horse actually lost 113 lbs. in weight under a month, and I was informed by one of the Officers superintending the experiments that he positively had to be carried back from the picket lines to his stable. During all the time that these experiments in concentration abroad and at home were being carried on, I was trying to work out in my own mind a system of "*compression*," and I laid down particularly these lines to go upon. I wanted to produce, if I could, a forage which should be as nearly as possible the horse's natural food; I then wanted to produce something which would keep properly, and then I sought for portability. I think the reports I have received of the forage thus produced, from India, from Zululand, and South Africa generally, from Bermuda, from Aldershot, and the Report of the War Office Forage Committee appointed in 1878, show clearly that all these special characteristics are fulfilled in this particular cake. I do not claim for that anything more than might be fulfilled by these samples of excellent forage which I see here, the product of another firm. With regard to its being a natural food and also to reducing it in bulk, the question of heat came in. I felt that the horse could not, as the lecturer has already said, carry on for any considerable time on a cooked or concentrated food, therefore the question of heat was a serious one, and after a number of experiments we were able, by drawing the line at a certain point, which I am not at liberty to state, to get a consistency through heat, under compression of two tons to the square inch, which enabled us to produce a cake which would remain in that particular form till broken. Then as to its keeping qualities. The one great point to be observed is the expulsion and exclusion of the fixed air. Practically these forages on the table are hermetically sealed, hence they are able to stand the test of time. Now I must just shortly tell you what the tests were. In India they were kept under cover and in the open for twelve months, and were found to be sweet and good. That particular specimen in the glass case has been in the museum of this Institution now something like nine years. I have not opened it, but I should like to see whether it is sweet or not now, and I should like to see it broken up. During the Egyptian Campaign I was requested to go to base stores at Suakin to examine some of my "*corn-cake*" to be issued to the cavalry brigade to which I belonged; I went down and found that the forage had been in the country from 1882 to 1885. I said at once that I hardly thought it was a fair experiment, as it had been knocking about up and down the Nile and so on, but I said perhaps the best thing would be to issue it and see if the horses did well on it. It was issued, and the whole brigade was fed upon it till the supply was exhausted, and there was no deterioration beyond this, that the outside of sundry bales had got damp and therefore mildewed, but as soon as the mildew had been scraped off it was found that the inner portions of the cake were perfectly good and sweet. So much for the keeping power. Another interesting experiment was carried out to show another value of it. You see the hay-cake, that hay-cake is really the invention of Sir Penrose Julian, and it was used years ago in the China and Crimean Wars. It was also used in this way. In the centre of the hay-cake was sometimes placed a large bulk of oats, and the hay was really the vehicle which carried the oats. But the matter of distribution showed the difficulty in using it,

for when broken up one horse got a great deal too much oats and too little hay, another too much hay and too little oats, so it was decided to experiment upon a cake made wholly of hay, and with the result that you have heard. That particular hay-cake was put to the test in a very severe way. Four blocks were suspended and sunk in the water in one of the docks at Liverpool. After the first week No. 1 was taken up; it was found of course to be wet all round, but the penetration of the water was an average of $1\frac{1}{2}$ inches. The second, third, and fourth weeks showed in the second, third, and fourth bales an increased penetration of water, but in no case had the water penetrated to the heart of the cake, they showed that not only was it very valuable from that point of view, but that it has great resisting power and I think floating power. There is yet another point, it is almost non-inflammable. If you try and burn one of these blocks you will find that instead of taking fire they will smoulder very slowly, so that if a ship is filled with 600 tons of this stuff the whole ship may be burned to the water's edge and all the cargo will simply tumble into the water in a state of char, but not burnt. Then, lastly, as to portability, the question was not so much to compress as much as possible, because with the machinery that manufacturers have in use you can compress to almost any extent, you can compress a cake to such an extent that it would require a hatchet to break it. That is not required on service, you want something compressed to such a degree that while it will stand the knocking about of transport on mules, in carts, in a ship's hold, on railway trucks, being transferred from ships to barges, into boats, crossing surf and all that kind of thing, you want sufficient compression to maintain it in its integrity until that is over, but not so much compression as to make it a matter of difficulty to the soldier to break it up. If you take that cake and put it on the ground cornerwise and lean upon it you ought under ordinary circumstances, and if the manufacture has been carried out correctly, to be able with just an ordinary push to break the whole thing up. Herein is the great value of the invention from the feeding and carrying points of view. The compression must be carried to this extent and this only, and here the science of the thing comes in. It must be compressed only so far that on being broken up it will resume its *normal bulk*, so that practically it comes to this, that you give the horse his natural uncooked food and that which fills him, as the heat applied does not alter the nutritive value or change the characteristics of the ingredients. These are the chief points to be observed in compression, and the application of heat to this product. In some cases if you give men too hard work in breaking it up after a hard day's march they are very likely to give it to their horses in lumps; that would be utterly wrong, it makes it more difficult for the horse to chew, and when in the mouth, the horse getting a lump of it and chewing, it would there resume its normal bulk, and he would waste half of it because it would fall out of his mouth. I have seen this in actual experiment, whereas if you make it so by compression up to a certain point it will break thoroughly, you give the horse really his natural food. It is not a matter of discussion as to which cake has the most nutritive qualities. You can make a cake of any combination of ingredients, treat it with turmeric, or Thorley's food, or some other highly-spiced condiment which I do not believe in for the simple reason that at some time or other on service the supply would fail and the horse would have to go back to the natural food available on the spot, with this result, that just as in the human subject, the man or woman who eats nothing but highly-spiced things, naturally turns away from plain food, so it would be and even more so with the horse. There is just one point I should like to touch upon before sitting down, and that is, I should like to emphasize very strongly what the learned lecturer said with reference to what we do in time of peace being a rehearsal for war. I am quite clear in my own mind that it is not the time to put a spade into the infantry soldier's hand when he is going to war, he must learn to use it beforehand, to make intrenchments. I am equally sure it is not the time to train mounted infantry to ride just as they land on the coast where they are to carry out what we call the operations of war. So, equally, I am convinced that if you are going to feed a horse, a delicate and fastidious feeder as a rule, upon such things as these, it is not the time to begin to feed him on them when he is put under climatic conditions and circumstances which he has not been used to. Therefore, I think what the lecturer has said, although I am quite sure he has asked for too much—I am rather inclined to take the view if you want anything from the War Office Treasury Department,

as a rule, you should ask for a little at a time, because, blessed is the man that expects little for he will not be disappointed—the lecturer has asked too much, he wants every horse to be fed upon this stuff, but I would respectfully suggest for the consideration of the authorities that these foods which have been presented to you to-day should be issued from time to time during peace to the whole of the horses belonging to the first line, and, if there is any over, to the horses that would replace them in that line owing to the circumstances of war. I must say I have very much enjoyed the able way in which the lecturer has dealt with the subject, and I am sure the Council of the Institution will find his paper a very valuable addition to their journal.

MR. C. P. GOODE : I should like to make a few remarks on this very important subject, as I have always taken great interest in the question of forage for Army purposes. As some of the samples which are before you are by the firm of which I am a member, I should like to add a few words to what has been said, as my experience has, I think I may say, been considerable. I have not only not confined my work to England, but have also taken the forage to Egypt, to India, and to France. The result of this experience I should like to give you. First, let me say that it is useless to attempt to send forage from England to the places I have mentioned, for the reason that cost of freight renders the forage too expensive. It is, however, necessary at first to incur the extra expense in order to ascertain whether this class of compressed forage is suitable to the different countries, and, if so, whether the process could be carried on in these countries, using materials natural to the soil. I am glad to be able to say that the Governments I above referred to gave my forage a trial, and the result being in every way satisfactory, it is, I believe, only a matter of time before it will become largely used. As regards India, my firm have already started large works at Amritsar in the Punjab, where we are now pressing daily very considerable quantities of fodder for the horses of the Indian Army stationed at Quetta. Although we have experienced many difficulties, the outlook is highly favourable, and each mail brings us encouraging information. I should add, the Viceroy's Government treated us very liberally, and are now working this business in conjunction with my firm. As Dr. Fleming said, the original idea was to produce compressed forage complete, composed of grain and chopped hay mixed together. Experience here and in India has proved that this class of forage is unsuitable, for the reason that the ration of the grain or of hay cannot be varied if required, and, as all animals do not require the same ration, it has now been decided in future that compressed forage should consist of two kinds, viz., (1) compressed grain, and (2) compressed chopped hay, to be covered in a different coloured wrapper to prevent confusion. The sample of grain-cakes you see on the table are composed of (1) crushed oats and crushed beans, (2) crushed oats and desiccated food, (3) compressed chopped hay, (4) compressed lucerne or alfalfa of American growth. Although they would appear at first sight too solid for use, they are very easily broken up. You will probably ask, What is desiccated food? It is a food which I invented some three years ago, and is composed to a large extent of Indian gram, which, as most of you are doubtless aware, is a most nutritious food, and one which entirely takes the place of oats in India for feeding horses. At the same time, it cannot be used in this country in its natural state. I therefore grind it into a fine meal, which, with a little salt, is semi-cooked. The result is that I have a most excellent substitute for oats, and one which can be supplied at a cheap rate. The food was tried at Aldershot in 1886 in the place of oats. It was also tried in the same year, as you here see it, in compressed forage. In both instances the experiments were a complete success, and I hope before long the War Office will decide to use it, either alone or in conjunction with oats. You will see in front of you three samples of lucerne, or alfalfa, as it is called in South America. I should like to say a few words on this point. You will know that the hay crop in England last year was a failure, and that the price of good old hay, fit for hunters, is between 6*l.* and 7*l.* per ton. Now, should we have another wet season this year, I think that you agree with me that our supply of hay would be very limited, in which case, prices would soon go up enormously, when not only would private individuals suffer, but especially the Army, whose requirements must be met in some way or another. France and Holland, although they supply us to a limited extent, only send us hay of very

inferior quality. My idea is, that this lucerne, or alfalfa, might prove to be a most valuable substitute for the English hay. I have lately had a small shipment of lucerne from Buenos Ayres. This I have been experimenting with, and, so far as I have gone, I am certainly of opinion that it is a most valuable fodder for horses, and I shall be much pleased if any gentleman here can tell me whether he knows of any ill effects caused by using it. The sample before you will show how close it can be pressed, and therefore how portable. I understand from a gentleman who has large estates in the vicinity of Monte Video that the supply is simply unlimited, and that thousands of tons are burnt every year, for the reason that there is no use for it. I have already proved that it can be easily pressed, and, as regards the cost, it is not expensive. I consider that it could be sold in large quantities at the reasonable price of 4*l.* per ton. It appears to me that, as regards forage, the War Department is absolutely unprepared for any emergency, only a small reserve being kept at Woolwich Dockyard. The present system of obtaining supplies seems to me unsatisfactory, for the reason that when Government requires a quantity of hay they send tender forms to the large hay salesmen in London, with the result that it is known by everyone that Government are buying, suspicions are aroused, and prices go up immediately. This can be avoided and a considerable saving made if, instead of sending out these tender forms, they would go to a man with a knowledge of the subject, and say: "We want, say, 2,000 tons of hay, can you manage it for us at a moderate price?" If this remark had been made to me, I should have replied: "Give me time and I can do it." My mode of doing it would be this. I should go quietly to work among the farmers and hay growers, submit a sample from the different stacks, and, if Government approved, buy the hay. The same argument would apply to compressed forage, but this business is more of a monopoly. At the present time there is only one manufacturer in this country, with the exception of myself, and I can say this, that if the War Department would only give us sufficient regular orders in peace-time to keep our machinery in order, we should always be willing to work night and day for them in war-time without charging extra, so long as the materials we used did not increase in value. I was very pleased a short time ago to receive a small order for 300 tons of compressed grain and hay cake, but the conditions were very strong, viz., "that we must guarantee the fodder to keep fresh and fit for use for twelve months." I am quite prepared to guarantee the forage supplied by my firm to keep fresh for twelve months; at the same time, I do hope that the Government will consider the question from our point of view, for it must not be forgotten that plant for compressing forage costs many thousands of pounds, and we cannot afford to have this machinery lying idle for several years, and then suddenly receive an order to be immediately executed. The result, I need hardly say, is unsatisfactory, as the machinery has to be continually repaired until the contract is executed, with the possibility that it is again to lie idle for several years. I very much appreciate the explicit way in which Dr. Fleming has dealt with this subject, and I trust it may lead to a satisfactory solution of the question before us.

MR. PAUL KRELL: Mr. Chairman, ladies, and gentlemen, I am not a military man, but I am a farmer, and I am a farmer in South America, where we grow this lucerne, and it grows there so readily and so abundantly that really and truly we should not require more than twelve months' notice in order to supply the whole world with all the fodder that might be wanted, it grows there in such abundance. It is sown with the wheat, which protects it while it is springing up until the wheat is reaped, and there is then a field of lucerne, which is cut four or five times every summer, giving an abundant crop. We have it there, cutting it with a common mower generally three or four times a year, and once or twice with a scythe. It must be cut, because if it is not fed off, which is very difficult to do in an abundant year, in a wet season for instance, the lucerne will deteriorate and will die out in time. I myself have had to burn down as much as 1,000 acres sometimes in one winter when it has been dried up by the frost, merely to get rid of it, and by doing so you actually strengthen the roots and it comes up stronger than ever. I have had about 500 acres of it for more than twenty years; it is really and truly everlasting. To my certain knowledge for twenty years hay has been made and cut and compressed like they press the wool out there in common wool presses and exported, and the Brazils,

Rio de Janeiro, Bahia, Pernambuco are all supplied with this hay and use nothing else. I know nothing about artificial food, although we have a great many horses. Still there is any amount of hay to be had there, sufficient as I say to supply the whole world. There is another thing I want to point out, it is a wonderful country for growing oats. I was the first to sow an oat there. They have a wild black oat, but I took out three sorts of oats, the Scotch, the Waterloo, and the Dutch, which really gave abundant, wonderful crops, but I could not sell a pound of it; nobody would buy it. All the horses there were then fed on barley or maize, and I did not know what in the world to do with it; at last Providence stepped in, my stack-yard was accidentally set on fire and my stacks of oats burnt.

The CHAIRMAN: At what price could you ship the lucerne to England?

Mr. KRELL: That is very difficult to say. Mr. Goode said just now that the freight was 10s. a ton. I should say it would be 1l. a ton. It all depends on whether freights were high or low.

The CHAIRMAN: You are only speaking of freight, but at what price could you ship the lucerne.

Mr. KRELL: We could deliver the lucerne at 3l. a ton, and make 1l. profit without any difficulty.

The CHAIRMAN: I can corroborate from experience what Mr. Krell has said about the lucerne. There is very little grown in England, but when I pass my summer in Germany I find that it is very much grown there.

Mr. KRELL: I have seen it in Bavaria, but it is a very poor crop.

The CHAIRMAN: Still it is cut four times a year.

Mr. KRELL: There is not the strength in it either.

The CHAIRMAN: I was only mentioning the number of times it can be cut.

Mr. KRELL: There is a piece of land near Wimbledon or Surbiton on the left hand side of the South-Western Railway where you see something like ten acres of this lucerne, sown some two or three years ago, and which I think must have given a fair return to the owner of it.

Colonel WOOD: With reference to the purchase of hay, I should like to mention that last November when I was over in Ireland, I was informed that last year was the best hay season they have had in Ireland for years and years. It certainly was one of our worst. I was informed that you could buy at that time anywhere north of Dublin almost an unlimited amount of hay at 30s. a ton. The cost of putting up machinery to press that hay and freight to England would make it 2l. a ton more, which would enable you to deliver the Irish hay here at 3l. 10s. a ton, certainly under the contract price paid all last year.

Colonel GRAVES: The same applied to Yorkshire too.

Major-General DUNNE: I am only going to ask one question of the lecturer. It is said that straw is too bulky and too indigestible for horses. For some years I was out at the Cape, and I never could understand why this should be so, as we always found there that the horses thrived on the straw. We used to ride forty, sixty, or eighty miles a day, and whenever you pulled up at an accommodation place on the road all you did was to "off-saddle" your horse, and give him a bundle of unthreshed oat-straw. He lived entirely on that straw and nothing else, and went on for months and months of hard work on that food. Cannot horses be trained or accustomed after a time to live on oat straw? I speak on this subject with great diffidence.

Lieutenant-Colonel COLVILLE: I have left the Army, but at the present time I am a director of the London Road Car Company, one of the large omnibus companies in London, and we of course always look forward to this, that in the event of war we might have considerable difficulty in feeding our horses, and indeed the Company might be ruined. Consequently, we are always looking out to see if there is any form of compressed food, or any other kind of artificial food, which might under circumstances take the place of ordinary forage. We collect all our food at one dépôt, and distribute it to the various stables all over London all chopped up in bags. Of course the distribution is a matter of great importance and one of expense, and there is no doubt that if the compressed food, such as we see upon the table, could be sold at a price that would answer the purpose of large companies, like the London General Omnibus Company and the Road Car Company, there would be a great

demand for it. Private enterprise would then step in and build the manufactories necessary to make it, and they would then be manufacturers in existence who would make it in time of war for the Government. Therefore it is simply a matter of £ s. d. Now we have not heard, and I have been listening, waiting to hear, what is the cost per ton of this compressed food. Naturally private companies won't pay more than a certain sum for their forage, otherwise they cannot pay a dividend. The moment forage in England goes beyond a certain price they go abroad for it. Companies, I think, are not at all opposed to trying experiments. I persuaded my colleagues to try an experiment the other day. We took a team of horses—eleven, and we tried them with one of these compressed foods. Statistics are always valuable, and perhaps you might like me to mention what the result of that experiment was, if it would be of any interest to the meeting. Without mentioning the food, I do not want to advertise any particular patent, I may say we tried that stud of eleven horses for four weeks. During the first three weeks they received some 3½ lbs. of this concentrated biscuit, 5 lbs. of oats, 3½ lbs. of maize, 2 lbs. of peas, and 12 lbs. of chaff. I may mention we always give our horses about 30 lbs. of stuff of some sort per diem, and that that varies in its constituents; the 30 lbs. given to each horse consists of the varied ingredients, but they are purchased in the market day by day, month by month, and week by week, at a price which will make the whole of it keep the average per horse. The proportions were gradually increased, and during the last week the horses got 15 lbs. of biscuit and 12 lbs. of chaff. Before they began each horse was carefully weighed, and at the end of the time each horse was carefully weighed with this result, that six of the horses lost weight. One horse lost more than 3 quarters 14 lbs., and the total loss of the six horses was 5 quarters 4 lbs. Four horses gained in weight, the total gain being 2 quarters 22 lbs.; so that the total loss on the eleven horses was only 2 quarters and 10 lbs. I mention that because one speaker said that it had been tried on one horse for a certain length of time and it lost 113 lbs.

Colonel GRAVES: That was during the experiments carried on under concentration: one of about twenty horses lost that actual weight.

Lieutenant-Colonel COLVILLE: It shows that six lost and four gained in weight. These horses were all working hard during that time; they were hauling these cars, which weigh some 28 cwt. empty, for ten to sixteen miles every day and three Sundays out of four, which is far harder work than any artillery or cavalry horse is called upon for, and the result was not at all unsatisfactory. Then it was found that this was also cheaper, that it saved some 2d. per week upon each horse, and you will soon see that 2d. a week on each horse will soon make a difference of 1 or 2 per cent. in your dividend. So that all these questions are simply matters of £ s. d. If you can bring this so as to be equally effective with ordinary forage, and at a price that will answer, you will have no difficulty in getting capital to start the necessary machinery. But of course the ingredients of this biscuit make a great deal of difference. I may state that this biscuit that we used consisted to a large extent amongst other things of locust beans, India meal, and linseed meal, and that there were no oats or beans or peas in it. Locust beans and India meal were the chief ingredients, besides other little things. I am extremely sorry the lecturer was not able to go a little more into the question of the supply of forage to our army horses at home, because that is a most interesting matter, and might form the subject of another lecture; but it does appear to me since I have left the Army and have given attention more or less to companies, and therefore to doing things on a business system, that the way the thing is done in the Army is about as little business-like as it is possible for it to be. I cannot for the life of me see why an establishment could not be started at Aldershot exactly as the Road Car Company for London, and why they should not buy their hay and corn and forage direct from the grower, and from the merchant or from abroad, and have it sent home in ship-loads. It might be sent down by canal regularly and stored, and then the forage could be all cut and sent out in bags, each bag containing the quantity for one or two horses, as the case may be; and it might be issued from the central store at a considerable saving, and with very great advantage to the horses. I do occasionally visit cavalry stables, I take the opportunity of obtaining any information I can, and it strikes me that if we supplied our horses with the forage that cavalry

horses are fed upon, and if our horses looked like some of those cavalry horses, the Company would be wound up in a very short time.

Mr. W. STANHOPE, 19th Hussars: I wish to state with regard to what Colonel Liddell said about compressed fodder, that during my experience of it, and we had some experience of it for three years from 1882 to the end of 1885, when some horses of the 19th Hussars were fed entirely on this forage, the quality was very indifferent indeed, and a good deal of it had to be wasted, but that which was good the horses did very well on.

Sir BEAUCHAMP WALKER: With your permission I should like to answer briefly Colonel Colville's remarks. He asked if compressed forage has so many advantages, why it is not more extensively used among London horse owners. The answer is simple, viz., it is not intended for the purposes he mentions, its value consisting of its great portability combined with its nutritive qualities, which cannot be obtained without extra labour, rendering it too expensive for horses belonging to omnibus companies. As regards the second question, I do not think the British Government will attempt the supplying of their own horses in the same way as is done by the omnibus companies for the reason that the officials in charge would be service men and frequently unpossessed of the business knowledge required for managing so large an undertaking. Secondly, the term of office of each one is limited, and should one man succeed his successor might fail. The Indian Government have arrived at the same conclusion, and have adopted a course which I consider a wise one, viz., they work in conjunction with private individuals who thoroughly understand the business they have in hand, and who are not likely to be giving up the business with Government as customers, so to speak, shareholders.

Colonel GRAVES: There is one question I might answer about the supervision as to quality. During the whole of the supply in the first instance, by the firm that made for me for the Government, there was a Government Inspector of some rank or other in the works every day of the week, and at any time he chose to come.

Dr. FLEMING, in reply, said: With regard to the more recent forage trials at Aldershot, I have not alluded to their results, as the object of my paper was really to place before you those of the trials which were made there some time ago. I do not think Goode's food would be a suitable forage for active service. I have tried in my paper to impress upon you the necessity of adhering as closely as possible to the food horses receive all the year round. The food upon which the horse is fed during peace-time should also be his food in war-time, if possible. The artificial preparation of food damages it more or less, so far as the horse's working powers are concerned. The trials at Aldershot, if I remember right, with Goode's food were made upon horses which were stabled. Army horses are not stabled usually during war-time; therefore, we are obliged to provide them with food which we know by long experience to be the best for those which are exposed to all kinds of weather, doing hard work, and undergoing all kinds of hardships. Therefore, I think that we ought to rely upon the results of experiments which have been made with food that the horses are usually fed upon. The oat is a sufficiently concentrated and proper food naturally for our requirements, and with the mode of compressing which you see here, I think we have an excellent grain forage for our horses on active service. We not only have the oat—which is a typical food, a food of the very first importance, but we also have mixed with it the bean, which every hunting man knows in a small proportion is a capital adjunct to the hunter's food. We also have a small proportion of linseed, which the Committee believed was advantageous in supplying a certain amount of heat-forming material and otherwise improving the food for the horse. So that, I think, in the grain-cake we have a capital food for service, and the experience of its use in India, and also in Egypt, shows that the food if well kept, is well suited for horses. With regard to the hay, that which was sent to the Crimea, to New Zealand, to Abyssinia, China, and elsewhere, was long hay. I have shown that feeding with long hay in the field, or on picket line, is a great waste. In muddy, soft ground, or in wet weather, a great portion of it is lost, and in windy weather much of it is blown away. Our system of feeding army horses should be entirely changed with regard to outdoor food. I think a bag such as the one exhibited should be used; it is a large bag, and the crushed grain and chopped hay can be mixed in this bag,

and the horse fed in that way. The experiments at Aldershot were absolutely conclusive as to the value of this mode of feeding. There was no waste; the horse did not have to throw up his head to get to the bottom of the bag, therefore the forage could not escape. He fed comfortably, for the head was not fatigued by the weight of the bag, and in every way the trial was most satisfactory. The bag is extremely valuable in the field, because it will contain three or four days' rations of the grain-cake, whereas the present nosebag will not. I therefore think that in chopped hay-cake and the oat-cake with it, we have a capital food for horses on active service. I believe the compression of these cakes might be carried even further, inasmuch as the hay and grain, if it be ever so hard compressed, is readily flaked off. I have seen cake which has been kept for a long time, but it is rather easily broken; a little more compression would give it more tenacity, and it would stand more knocking about. With regard to accustoming horses to this food, it would be a very good thing if all army horses could be fed one day in the month on compressed forage. Certainly the horses of the 1st Army Corps ought to be fed upon it once a month. The soldier would then be taught how to handle it—how to break it up in the nosebag, and mix it well. The cost of a thousand tons a year would be not greatly beyond the ordinary expense. The Committee reported on the cost of preparation, but as this was ten years ago I am not sure whether any diminution in the cost of preparation has taken place; the cost of the manufacture of the hay-cake in 1882 was 3*l.* in excess of the price of hay per ton. When we calculate the difference in the cost of carriage by ship, and the cubic space required, that a smaller proportion of hay will suffice for a feed, and the great convenience for distribution, I think that excess of cost in the preparation is amply repaid. With regard to the grain-cake, it was 14*l.* per ton as against oats 10*l.* per ton, that is 4*l.* per ton for crushing and compression.

Colonel GRAVES: The oat-cake is supplied now at 10*l.* 10*s.* a ton.

Dr. FLEMING: That is much less. So that with the diminution of the ration which can be made, the great saving in carriage, the handiness of issue, and the absence of waste, I think altogether there would not be any loss—in fact, a great advantage. The bran-cake I look upon as a very satisfactory production. Bran hitherto has not been used in the field, even on board ship there is great trouble with it; but now in the form of this cake, it can be supplied in the field, and it can be carried on board ship easily and with safety. The difference of cost is 3*l.* per ton—a very small difference indeed. With regard to the specimen of alfalfa, or South American lucerne, which is shown here, I do not know of any experiments having been made with it in this country, but I think it is a most valuable forage. The compression appears to improve it wonderfully. There is a section of a block which has a beautiful bouquet, and I am perfectly certain horses will take to it readily. If it can be purchased at a moderate price, it should prove a valuable auxiliary fodder. If this can be obtained from South America in the quantity which is mentioned, it will effect almost a revolution in the hay growing in this country. With regard to Irish hay, the hay both in Ireland and Scotland is not at all adapted for compression. It is allowed to lie on the fields, and become extremely dry and washed out, therefore it is very difficult indeed to transport; while it is so dry that it will not compress. With regard to straw in this country, we do not look upon it as forming part of the ration for our horses. There is no doubt that wheat straw is indigestible, and not good for horses. In South Africa, where the horses are fed on unthreshed oat straw, it is undoubtedly a good forage. Oat straw is that which is best adapted for the horse if straw must be given, and it is a fact that the Cape horse accustomed to oat straw will thrive well upon it. With regard to weighing horses in testing the value of the mode of feeding or kind of food, I think unless weights are very carefully watched, they are extremely fallacious. I do not look upon testing the weight of a horse before a trial of forage and after it, as a very reliable criterion. We ought to look more to the vigour of the horse, to his working prowess, than to his weight. We all know that a horse fat and out of condition will weigh heavier than the same horse when in good condition. At Aldershot, we are too much inclined to lay stress upon a horse's weight, or an increase or decrease of weight. Unless you take into consideration also the working powers of the horse, you are likely to be led into error. If the

horse loses weight, but gains in vigour and strength, you may be certain the forage agrees with him. I do not know that I have anything more to say. I thank you very heartily for your kind consideration, and am only sorry that time has not allowed of expanding my paper so as to cover wider ground.

The CHAIRMAN: I do not think you have been in any way disappointed in the anticipations which I held out to you before opening the proceedings. I told you I had read the lecture with great satisfaction, and I was quite certain you would hear it with equal satisfaction. It is a remarkably interesting lecture, and I think our very warmest thanks are due to Dr. Fleming, the more especially as he tells me that on some future occasion he will supplement his lecture by another. I beg to thank him very much.

Friday, March 15, 1889.

GENERAL G. ERSKINE, Chairman of the Council, in the Chair.

EMPLOYMENT OF DOGS FOR MILITARY PURPOSES.

By Veterinary Surgeon E. E. BENNETT, Army Veterinary
Department.

Preface.

IN being allowed the privilege of bringing to the notice of the members of this Institution the many services which dogs, when specially trained, can render to man in the art and science of war, I have been guided not only by the fact that their utility is being fully recognized and taken advantage of by most Continental Armies, but also that antiquity itself in no small degree sanctions their employment in war. It is to strengthen my position that I propose to preface this paper with the history of the war-dog, from the earliest time to the present day.

In one of the oldest books extant, the Vendidad of Zoroaster, we read, "through the instinct of the dog the world exists," and however much this may appear to be an exaggeration, still we must admit that even in the present day it prevails with a certain amount of exactness, for in the northern regions it is an acknowledged fact that without their dogs the people could no longer exist.

From the earliest times, so history tells us, dogs have been employed as auxiliaries in war; they were in frequent use in the Greek and Roman Armies. Plutarch recounts that the garrison of a Greek fort being worn out with fatigue, their enemies decided upon an assault, but by good fortune a dog belonging to the fort made his way to the adjacent town, and by his barking managed to arouse the inhabitants in time to come to the succour of their beleaguered comrades.

The translator of Arian observes, that of all the pugnacious dogs of the classic file, the most renowned were those bred in Epirus, and called Molossian, after one of its chief districts. The prowess of the Canes Molossi rendered them most useful in battle, and they were equally prized in the circus and amphitheatre; their war praises are sung by the Muse of Darcus, and it is recounted that the soldiers of Molossia wept over their faithful canine companions slain in war.

Corinth is said to have been saved by fifty war-dogs, which attacked the enemy who had landed whilst the garrison slept after an orgie, and fought with unbounded courage till all were killed except one, which succeeded in rousing the garrison. Shakespeare thus puts no

figure of speech in the mouth of Antony when he exclaims, "Cry havoc and let slip the dogs of war."

Two hundred dogs brought back from exile the King of the Garamantes in fighting those who opposed themselves to his return.

Polyen recounts that the King of Sparta, when besieging Mantinea, posted numerous dogs which kept watch, and they were the means of intercepting messengers and stopping those who tried to escape.

The Magnesians, in their wars against the Ephesians, attached a dog to each warrior, and these being the first to advance, their advent invariably caused trouble in the enemy's ranks.

The Colophonians used cohorts of dogs, and those of the Cimbrians defended the chariots of their wounded masters during their retreat from the Romans.

Philip, King of Macedonia, wishing to conquer the country of Argile, which abounded in woods and mountains, had recourse to a large number of mastiffs to enable him the better to follow up the intrepid mountaineers.

The Huns of Attila confided the safe keeping of their camps to dogs of colossal size and strength.

The Romans, recognizing the value of dogs, kept those of keen scent and hearing in their forts and watch-towers to give warning of the approach of an enemy: during one of the assaults of the Gauls on the Capitol, the dogs, being worn out with incessant privation, failed, however, to give timely notice, and it was left to geese to give the alarm to the Roman soldiers.

Massinissa, distrusting his courtiers and followers, organized a body-guard of dogs.

A manuscript of the 14th century contains the following passage: "Dogs are trained to savagely bite the enemy, they are coated with mail, and carry a brazen vase on their backs partially filled with a resinous substance, together with a sponge soaked in spirit; the horses of the enemy, thoroughly upset by the bites of these creatures and by the burning fire from the vases, fly in disorder."

The famous dogs of the Knights of Rhodes, which could tell at a distance a Turk from a Christian, and treated him accordingly, were mastiffs brought from England.

The Spaniards employed dogs against the American Indians, bloodhounds being in especial favour, and they took an active part in their proceedings. They drew their rations like soldiers, and many a native was run down by them in the dense forests and other almost inaccessible places.

They were found of such utility in Peru and Mexico, that the King of Spain decreed a pension for the maintenance of these brave allies.

The Irish deerhound had a great repute in Iceland, and was the constant companion of the Olafs, even accompanying them on their vessels. It is recorded of Olaf Paa, in the Saga of Nials burning, that in making a representation to Gunnar he said: "I will give thee three things: a golden bracelet, a kirtle which belonged to Myrkiatin, King of Ireland, and a dog which I got in the same country; he is

huge of limb, and, for a follower, is equal to an able man ; moreover he hath man's wit and will bark at thine enemies but never at thy friends, and he will lay down his life for thee : Samr is his name."

William the Silent, the Founder of the Dutch Republic, owed his life to his spaniel, for in the night attack before Mons, the Spaniards were on the point of entering the monarch's tent, when the dog sprang forward and tried by barking to arouse his master, but this not sufficing he finally scratched his face with his paws ; there was just time for the Prince to mount a horse that had been left ready saddled and to escape in the darkness ; his attendants and servants, however, lost their lives.

In suppressing the Irish rebellion during the reign of Queen Elizabeth, the Earl of Essex had 800 dogs, bloodhounds it is said, which accompanied the Army.

St. Malo, when it formed a separate Republic, was guarded by 300 dogs, which were kept at the expense of the city, and which effectively protected it against surprise and pillage.

The Piedmontese in the 16th century employed dogs in their mountainous wars, organized in bands of 200 each, and found them of much utility.

Philip V, in 1702, at Mont Philippe and at the Fort of Etoile, fed the dogs which were at the gates and which remained uncared for by the Austrians, and afterwards turned them to useful account, as auxiliary sentinels and for accompanying the patrols.

In 1769 it was seriously proposed by the English to use dogs against the North American Indians, to follow them up, and for the better security of the camps, for many sentries were killed on their posts by the natives.

In 1778 the Turks were signally helped by dogs, both at the siege of Dubitz and at Gino Berdo ; they used them as a cordon to guard their camps, and in later times to track the unfortunate inhabitants of the countries they were devastating, and who sought an asylum from their rapine in the woods and caves.

In the history of the defence of Tangiers by the English, occurs the following allusion to dogs : " One morning early the Moors laid a great ambush within the palisades of the Western Cove, with the intention, as we supposed, of intercepting our guards on the relief ; but their presence being detected by the dogs which were *purposely* kept, they, by their barking, put our soldiers on the alert, who appearing with so much readiness with their arms and grenadoes to oppose the enemy, the latter immediately withdrew, but not before many were killed and wounded."

The fame of the dog Moustache is renowned ; when encamped with his regiment before Alexandria, the first night he was the means of detecting a surprise ; he fought at Marengo and saved the standard of his regiment at Austerlitz, for which service he was decorated on the battlefield by Marshal Lannes ; he served also in the Spanish Campaign, and was here again of great use in the detection of ambushes ; he was finally killed by a bullet sometime after the siege of Badajoz.

In 1822, during the siege of Athens, the insurgents tried to carry the city by assault during the night; the dogs, which were in great numbers within, kept up an incessant barking and so disconcerted the rebels, that they were unable to carry out their design.

During the siege of Sebastopol, the French are said to have several times received early warning of sorties through the agency of a dog called Minette; and their sentries in the trenches received much valuable assistance from several dogs that from time to time accompanied them.

The Arabs in Africa frequently employed dogs against the French; these animals like those of Burmah have an intolerable dislike to all Europeans, and in fact to every one that does not wear the burnous; the French, recognizing their utility, enlisted dogs into their service with signal advantage: thus, during the rebellion of an Arab tribe, the garrison of Milianah were aided by a four-footed ally, which had previously been instructed in the art of reconnaissance; every day they sent him out of the town, and he would scour the vicinity in every direction for a distance of 1,200 metres; he replaced the patrols, and the scouting was as effectually yet more rapidly carried out, and without danger to any one. After the capture of Bougie by the French, the natives frequently killed the soldiers on outpost duty at night, and often carried off arms, ammunition, and cattle, and it was only by the use of forty dogs that these tactics were put an end to.

In Mexico, during the French campaign, they were most useful in giving alarm of the approach of the much-dreaded guerillas, and they were further employed for tracking these desperadoes to their fastnesses.

After the famous expedition of General Skobeleff in Asia Minor, the Russians decided to instruct dogs as sentries, and without doubt this decision was arrived at from the frequent and fatal surprises that their adversaries inflicted on them (they are now used for artillery as well as the other arms in that country). Finally, the Germans, always to the fore in the art of war, took up the question of war-dogs, their first experiments being carried out at Goslar in 1885-86, where they were chiefly instructed in outpost duties; and it was in 1887, whilst present at the manœuvres in Brunswick, that I first made the acquaintance of the military dog and was led to recognize his utility. About twenty dogs of all shapes and sizes were attached to the Jäger Battalion (the equivalent of our Rifles), for these being always employed with the advance guard, and composed chiefly of foresters, who are naturally skilled in the care of dogs, it was considered that the experiments would there find every reasonable chance of success.

The services which we may be led to expect from the enrolment of dogs into an army are varied, and cannot altogether be definitely laid down; but there are at least five distinct objects for which they can be used, viz. :—

- (1.) As *Auxiliary Sentinels* to the outposts and sentries and to the advanced rear and flank guards in general.
- (2.) As *Scouts*, on the march, on reconnaissance, and patrol duties.

- (3.) As *Despatch Carriers*, on the march, in camp, in action, &c.
- (4.) As auxiliary *Ammunition Carriers*, on the march and in action.
- (5.) As *Searchers* for the wounded and killed after an engagement.

The rôle of sentinel being the most important, I have placed it first, and we must now pass on to consider more in detail the various conditions under which dogs can be usefully employed in war.

* *Rôle as Auxiliary Sentinel to the Outposts, &c.*

Every body of troops in the field is dependent for security upon its outposts; their duty is "to act as the feelers of an army, guarding it from every danger, and keeping it constantly informed of everything that can add to its safety or assist its movements."¹ At night, specially, it is of the utmost importance that troops have the full benefit of undisturbed repose, and it is upon the sentries that the arduous and responsible duty of guarding the camp or bivouac mainly falls; they are now posted double, which, although greatly enhancing the general security, increases the number of men employed on this fatiguing service, to the detriment of the efficiency of the advanced guard supplying them. It is at night, and during inclement or foggy weather, that the endurance and powers of perception of the sentries are most keenly tried, when even the most seasoned soldiers are liable to error, and mistakes made by causing unnecessary alarms are often most baneful in their results, and if oft repeated, end by being unheeded by the remainder of the outposts, and an important safeguard to security is liable to be destroyed.² It was a saying of Frederick the Great, that it was pardonable to be defeated but never to be surprised, yet the history of nearly every war gives frequent testimony to the havoc committed by night attacks and surprises; and these same attacks are, it is considered by competent authorities, likely to play a very prominent part in all future campaigns, for an enterprising enemy if successful would reap the advantage of having gained their point with the least possible loss to themselves, which in these days of magazine rifles and quick-firing guns is to be by no means underrated. Attacks of this kind are much favoured when troops are wearied by long marches, and when the sentries, besides being fatigued, have in addition to struggle against hunger and severe cold, under these adverse conditions their faculties become dulled, and they become more or less indifferent to danger; anything therefore which will tend towards increasing the security of the sentries should be gladly welcomed, and it is just in this position of affairs that the services of the military dog would shine to greatest advantage. It has been ascertained that on a calm night with a fair wind, dogs can with certainty detect the approach of strangers up to from 400 to 500 yards, and in inclement weather it may be assumed that this faculty, a combination of scent and hearing and to a minor degree sight, will reach up to 150 or 200 yards, and not only this, they

¹ *Vide* Lord Wolseley's Pocket-book.

² "Minor Tactics," Colonel Clery.

can distinguish between friend and foe and will act accordingly ; granting that, in average weather, nothing will escape the vigilance of our canine friend up to say 200 yards, then if each double sentry be supplied with a dog, and they be posted at 300 yards apart, the interval will be guarded by the two dogs with perfect ease, supported by the men. When in an enemy's vicinity the cordon system has to be maintained, to prevent them penetrating the line of outposts and obtaining information. With the assistance of our four-footed allies the number of the outposts can be materially reduced, without in any way endangering the safety of the troops which they cover. Again, if from any cause a line of sentries has to be posted through the centre or through a portion of a wood or forest, the disadvantages of so doing are reduced to a minimum, and further, the necessity of diminishing the distance between the sentries at night and between them and the supporting picquet is no longer required, and the additional security gained by the extended night line will do much towards insuring the benefits of full repose to the troops. I think therefore that we may fairly assume that the chances of successful night attacks and surprises will by the employment of dog vedettes be very greatly lessened, if not altogether prevented.

The Dog Scout: his Rôle on the March, on Reconnaissance, and Patrol Duties.

Marching is one of the most serious considerations in war, its chief object being to bring troops to the right place in the least possible time compatible with efficiency ; rapidity of movement is, therefore, one of the main points to be aimed at. In our recent wars against semi-civilized troops in hot climates, mobility has necessarily been an essential ; and in order that our men might be as little hampered as possible, kit and baggage generally have been considerably reduced ; but this very rapidity of motion, when in an enemy's neighbourhood, must enormously increase the responsibilities of the advanced guard and reconnoitring parties, and, however desirous men may be of conscientiously performing their scouting, they must to some extent give way to the urgency of getting the main body forward. In an enclosed or mountainous district, where the work of scouting almost entirely devolves upon infantry, the duties of the advanced guard are both onerous and fatiguing, and the security gained is in no way commensurate with the efforts towards obtaining it. Repeatedly have they to reconnoitre woods, ravines, outlying farms, hamlets, and other places likely to afford shelter to the enemy, and these may lie at some distance to the right or left of the desired route, yet they cannot be passed by, parties must be detailed to scour them, and it is imperative that they rejoin with the least possible delay. This service, constantly recurring, is most trying to the men, and may end by being only imperfectly performed ; every detail, therefore, which will in any way lessen the strain put upon them, is worthy of careful consideration, and I think it must be admitted that by enlisting the intelligence and activity of the dog, a most powerful ally is obtained. In accompany-

ing the scouts they can during the day be made to range at a convenient distance in front of them, increasing the confidence of the men, lessening fatigue, and allowing the work to be as efficiently, yet more rapidly, carried out. When in the vicinity of small woods and coverts, the dogs can be sent forward to scour the outskirts, and later in penetrating them together with the scouts, which they should always precede, and, just as the pointer denotes without fail the presence of the quarry, so will our war-dog, with unerring certainty, detect the enemy if near at hand, and by his demeanour give timely notice of his whereabouts.

In woods and forests, too large to thoroughly reconnoitre, our new allies will materially augment the zone of surveillance, and, although the enemy may not be seen, yet they will readily be aware if he has recently passed over the ground, and this knowledge would naturally be of no small benefit to a column obliged to traverse such wood or forest. When villages have to be entered, the dogs will be made to go on in advance and to scour side streets, farmyards, &c., and much valuable time will be saved thereby, and it need not be feared that a dog properly trained is ever likely to lead one into error. In defiles, ravines, &c., a similar method can be adopted and their passage much facilitated. The summits of hills also can be scoured, preparatory to the scouts passing over. For the flank and rear guards they can in like manner be made use of, and they will increase in no small degree the vigilance and confidence of the men and the safety and welfare of the column. In mountainous regions, during bad weather, our dogs would be of much utility in enabling paths to be discerned, crevices and pitfalls generally to be avoided, and in the event of detached parties going astray, succour to be brought to them with all celerity. In this particular service the St. Bernard would be specially valuable, for the renown of this breed under these conditions is notorious: one dog alone, Barry by name, has a record of having saved over forty lives by his own individual exertions. Moreover, in an open country, during severe wintry weather, when cavalry, owing to the slippery state of the roads, could with difficulty, if at all, act, the military dog would here again come in as a useful adjunct to infantry, and would render the latter in some degree independent of the sister force. In night marches, when additional precautions to those necessary for troops during daylight have to be undertaken, the faculties of the dog would better enable the advance guard to perform their duties, and they would assist in the avoidance of regrettable mistakes and help in the detection of ambushes and surprises.

Rôle as a Despatch Carrier.

Doubtless cavalry are the best means for keeping up the communications between the different fractions composing a column, but their duties are so multiplied, that they are not available for every service, and there are times, for example at night, when they cannot always be made use of. Signalling, too, is a very valuable method of transferring messages, but it has the drawback of requiring skilled

men for carrying it out, and moreover in an enclosed country, or in woods, or owing to the natural disposition of the ground, it may be altogether impracticable, and it has the disadvantage of attracting the enemy and putting them on the alert, and when in close proximity to them it is impossible to attempt to sustain it, and again at night it may with no small difficulty be established. By the aid of our dog courier we have a method of communication available at all times, and under all conditions of weather and ground. The message being written is placed in the pocket of the collar, and the dog despatched on his mission, which if well trained he will carry out with wonderful rapidity. This system has the advantage of sparing both men and horseflesh much fatigue, especially in a rough country or hilly or swampy district. There is a happy reference on this point in Tom Bulkeley, of Lissington, where we are told a brigand chief of Albania entrusted the conveyance of secret despatches to his faithful hounds. The following details of a trial recently carried out by the Berlin Sporting Club between cyclists and dogs are interesting. The distance run was 2 kilometres (about $1\frac{1}{4}$ miles). A fine pointer completed the course in 2 minutes 45 seconds, being closely followed by a succession of setters and mastiffs; the leading bicyclist took 4 minutes, only a few lengths ahead of a poodle, while two tricyclists came in last, having occupied 5 and 6 minutes respectively for the race.¹ In some earlier trials in the same country it was found that dogs were second to pigeons, whilst they far outdistanced cavalry in the rapidity with which they covered the ground. It is in no way advocated that the dog courier should supersede cavalry or signallers, it is simply an additional method of keeping up communication, and should therefore be conjointly used with the other methods now in vogue.

It is at night with the outposts, patrols, and reconnoitring parties that the dog messenger would be most useful; if through any misadventure a detached party should lose its way and fall into the hands of the enemy, the dog might be let loose prior to its actual capture or annihilation, and his return alone, though bearing no despatch, would be an indication of the occurrence, and would be the means of putting the outposts and picquets on their guard.

The Dog as an Ammunition Carrier.

The question of the supply of ammunition to the firing line in an engagement is one of much importance, and is at all times a hazardous undertaking. The distance between the reserve supply and those in action may be considerable, and under a hot fire the chances of the carriers arriving safely at their destination is often small, for the enemy may very possibly direct their fire specially on these men. Our war-dog may here again be employed as an auxiliary carrier, and being comparatively small and moving rapidly, he will not attract the notice of the enemy to the same extent. For isolated parties in advance of the main body, and over ground that men could only with

¹ On an ordinary road.

difficulty traverse, and always on the outward march, dogs could be utilized in the manner indicated.

The Dog as Searcher for the Wounded.

To aid in the search of the wounded and killed, the dog can again be turned to good account, specially so in an enclosed and well-timbered country, and in snowy or foggy weather. It is almost impossible in these days, when armies are of such immense size, and actions in consequence extend over such a large area, to collect all the wounded; many crawl to a place of temporary shelter, and there wait anxiously for succour, which may not arrive in time to prevent them dying from exhaustion or long exposure. Search parties aided by dogs would be greatly facilitated in their work and much unavoidable suffering, such as occurred in the vineyards round Metz, would be prevented. The dog could carry a flask containing some hospital comfort, which at night would be much appreciated by the wounded, until other and more substantial help arrived.

Other General Conditions under which the Military Dog could be turned to advantage.

In Sieges.—During the investment the number of sentries could be considerably reduced without in any degree detracting from the complete isolation of the invested fortress from the outer world. Sorties also would have less chance of success, for long before the sentry would be aware that anything unusual was astir, the dog would warn him of the impending danger, and the time thus gained, would be of great moment in getting under arms.

To the besieged they would be useful as scouts and sentinels, and from previous considerations on this point it will be unnecessary to recapitulate.

In Camp.—The dogs could be placed as auxiliary sentinels over ammunition, stores, and baggage; petty robberies of comestibles would be of less frequent occurrence by their use, for it must be remembered that natives, muleteers, and others who are employed both in camp and on the line of march are particularly partial to sugar, tea, coffee, salt, and other edible stores, which they purloin not only to consume, but to sell.

Again, for the better protection of convoys on the march and when parked at night; with foraging parties when entering hostile villages and hamlets, and for helping to suppress brigandage, our dog could fulfil his mission.

For the prevention of the tactics of such people as the Ghazis and Soudanese who at night stealthily approach sentries and at an opportune moment fatally stab them, carrying off arms and ammunition; this oft repeated, ends by establishing a funk, and without just cause sentries may fire at some imaginary foe and thereby raise an alarm which cannot but be detrimental to the *morale* of the troops. The Ghazi, not content with the life of a single sentry, will get into

camp and run amuck, as it is termed, stabbing several before he himself is winged. By the enlistment of dogs these tactics will be a thing of the past, and many valuable lives spared.

The Breeds to Employ.—You never know your dog until you try him; some of the most unlikely will with care turn out the best, though, for the sake of appearance, it is well to avoid enlisting curs. Undoubtedly, for all-round purposes, the *Native or Farmers' Sheep-Dog* has most to recommend him; he has been trained through many generations to watchfulness and obedience; he is very observant, tractable, and easy to teach, carrying out his orders with alacrity and cheerfulness; he would make the best of sentinels, as he accustoms himself easily to remain for long periods on the same spot; he would be a most reliable despatch carrier, as he has a great sense of honour and nothing will seduce him from the performance of his duty. In Australia the sheep-dog is often the sole means of communication between the shepherd and his master, and travels long distances in this way with his despatches; it has been truly remarked that every collie is born with a certain amount of good sense, and it is only a question of training whether he turns out well or ill; there never was a truer proverb in his case than "Like master like dog." With all these attributes it might be thought inexpedient to enlist the services of other breeds, but as it is unwise to "pin your system to one particular class, we must give others a chance of proving their merits.

The *Retriever* makes a good war-dog; he will usually stand fire well, and is strong and can therefore be advantageously used as a carrier of ammunition, and he would prove useful in search of the wounded.

Pointers and Setters could, after a few generations spent in military service, be turned to very good account, more especially for tracking purposes, as their sense of smell is very highly developed; a remarkable exhibition of this power in pointers was lately recorded in the "Field."

Spaniels have much to recommend them. In Germany they are considered second to the sheep-dog; they have good noses and will hunt out the whereabouts of their master with perseverance and rapidity; moreover, they are small and would attract little notice, and being fond of the water they would not be daunted by a stream or river intercepting them on their journey.

Bloodhounds are, *par excellence*, the hounds for tracking, they would be of infinite service in following up parties of the enemy who might be troublesome, through woods and in other places difficult of access, such as mountains, jungles, ravines, &c. Dacoits and other marauders could soon be run down by their means, and a most harassing system of warfare be thus signally checked; their powers of scent are so acute, that I am assured they neither require to hear nor see, but will give warning of the approach of any person, even at a very considerable distance, by scent alone. The recent trials at Boxmoor, and those of the Kennel Club, are sufficiently convincing of the high merit of this breed.

Poodles are easily taught, but are of much too friendly a disposition

to be altogether depended on. They positively enjoy carrying things, and would be useful as auxiliaries in the supply of ammunition, and of aiding in the search of the wounded.

The *Pommeranian* having an inherent dislike to all strangers, and being of a most suspicious turn of mind, could be turned to account as an auxiliary sentinel, but owing to the great difficulty in teaching him not to bark, his employment is not altogether to be recommended.

In Germany, many other varieties besides those we have mentioned are trained in military duties, *e.g.*, greyhounds, foxhounds, terriers, &c.—each useful in their way. Terriers being always on the alert, would be capital sentinels; foxhounds could be employed specially for tracking, and greyhounds for speed, as message carriers.

In France the sheep-dog is in greatest favour, though it is said the smugglers and Customs dogs on the Belgian frontier (a species of sheep-dog) would be by far the best for all-round purposes.

In Austria, the Dalmatian is used amongst others. In Russia the Caucasian dog, and in Turkey the Asiatic sheep-dog. In Italy various breeds, and the Italians consider females preferable to males, owing to their keener scenting powers.

In this country, where our breeds of dogs have been brought to such perfection, we should have every advantage in giving the *system* a very much more thorough trial than on the Continent, with, at the same time, a greater chance of success. I do not see why, if the military dog became a recognized institution, we should not form a special breed of war-dogs, just as there are dogs for the chase, dogs for the gun, &c.

It has been suggested, though not seriously, I think, that a fighting breed might be established, which would run down and kill all the four-footed warriors of the enemy, just as the Customs Officers' dogs are taught to run down those of the smuggler persuasion on the French and Belgian frontier. It is said that there are considerably over 100,000 dogs employed in this contraband trade, but owing to their cleverness hardly more than 1 per cent. are yearly caught in the act.

Training, Treatment, and General Care of the War-Dog.

We have already pointed out the principal ways dogs can be of service to an army in the field, and their training would naturally be undertaken in these different directions. There is no royal road, I am afraid, to the completion of their education—much patience and perseverance is required, and a natural aptitude on the part of the trainer to improve upon the gumption of the dogs, and to adapt himself to the varying peculiarities of each.

As scouts, they can be easily trained, every dog having a natural predilection for ranging. They should be encouraged to range in front of the trainer up to any convenient distance, and in order that they may realize what is expected of them, soldiers should be posted here and there, and whenever they come within reasonable proximity to these men, the latter should, if the dogs do not take notice of them, either pretend to, or actually strike them, so that they may be put on

their guard, and after a short time it will be found that the dogs will be fully alive to the occasion. Barking should, on no account, be permitted, but by growling, returning to the trainer, or other indication, they must give warning that danger is near at hand.

The Germans dress men in French and Russian uniforms (and the French have recourse to similar means), who lie in wait and frighten the dogs, so that very early in their education they learn to recognize the common enemy.

At night it is prudent, unless you can thoroughly trust your pupil, to have him led on a chain, he will then be under direct control, and there will be little or no danger of his barking, for he would otherwise put the enemy on the alert; and his faculties of perception are, even when prevented from ranging, sufficiently acute to enable him to detect a stranger at a very considerable distance.

To act as sentinels dogs take kindly enough; each sentry (double) should be supplied with one, and they should be exercised by day, and specially by night, to give early notice of anything unusual astir.

The rôle of courier will be the most difficult to inculcate; he will probably take kindly enough to the preliminary training, which is carried out by taking the dog a short way from his master, and letting him return at top speed, and gradually increasing the distance until he will come back with certainty at least a mile or more; this should be practised by day and by night, and it is imperative that the dog be taught to use his nose, for it is not altogether wise to allow him to trust entirely to his bump of locality. I find that my dogs perform their journeys at night almost quicker than during the day, the disturbing influences are less, and they seem to think it a matter of life and death to return as rapidly as possible. They must be instructed not to allow any stranger to intercept or stop them, this there is little difficulty in as a rule. One well-trained collie in a German regiment on the approach of anyone he does not know, will hide himself in the nearest ditch or other convenient place, and will wait until he passes, the dog then continues his journey only to repeat the process should he be again intercepted, and will persevere in this manner till safely arriving at his destination. For carrying despatches, a leather pocket must be attached to the collar of handy size, and easily to be opened and closed.

As ammunition carrier to supply the firing line, the method of training is very similar. Harness with properly adjusted paniers (as shown) will have to be worn. Those which I employ are constructed to carry eighty rounds (8 lbs.) which in the new ammunition will amount to double that number for the same weight. The dogs will further be taught to stand fire. To search for the wounded and killed, men simulating these conditions must be posted here and there on the ground the dogs range over, behind trees, hedges, houses, &c., and having found their man, they must return to the search party, and give indication of his whereabouts. They might carry a tablet and pencil on which the wounded man could write, localizing his position, which would be of great use to search parties at night.

The training should first be undertaken at from six to nine months old, daily lessons of such a length as not to weary or disgust the dogs, remembering always that progress to be real must be gradual, and that kindness must be the guiding rule of those in charge.

As to the care of the dogs in regiments, volunteers should be called for, and none but reliable, good-tempered men be allowed to look after them. If it is proposed to employ two dogs per company as in foreign armies, then one man per company should take charge of and feed them. Doubtless the Officers would assist in this matter of housing and keeping them, for it would be to the mutual benefit of themselves, their regiment, and the Army at large, and as most Officers have a dog of some sort, it would be preferable to keep one that was useful rather than one that was not.

In Germany each dog has a separate kennel or barrel, but I think if housed by the Officers, non-commissioned officers, and men, it would be better, as the dogs would more closely associate themselves to the regiment, and would be more constantly in contact with the human controlling influence; the kennel method further has the decided disadvantage of being provocative of barking.

As to their food, the leavings from the men's dinners, surplus vegetables and bread, with additions from the Officers' and sergeants' messes, would be more than sufficient to feed all the dogs necessary; in this way no extra expense would be incurred which might seriously militate against the introduction of such a system into any army. The young dogs should be fed twice, the older once daily. In cold weather when doing sentry duty at night, short-haired dogs should be provided with a coat made from any rough material at hand, this will add to their comfort and enable them the better to perform what is required of them.

The supply of dogs for military purposes would, I feel sure, be readily met by the sporting public, who would supplement those belonging to the Officers, by the surplus from their kennels; but if sufficient were not forthcoming, the expense of purchasing puppies at from four to six months old would not be very great. Many Volunteer regiments might in all probability take up the system and would gladly yield up their trained canine companions in the time of national need.

Further, after obtaining a substantial footing it might be thought desirable to start a special kennel for the supply of dogs, and bred from those already doing duty with the colours.

The Naval Dog.

In these days when in naval warfare such a very sharp look-out has to be maintained against the approach of torpedo-boats at night, the dog might materially assist those employed in keeping watch; he might also be most useful in foggy weather in the prevention of collisions by giving timely warning of the whereabouts of approaching craft, and further when night attacks and assaults have to

be made on shore, the various uses to which we put the military dog could equally well be undertaken by his naval *confrère*.

In conclusion, I beg to point out that in the foregoing paper I have endeavoured to show the advantages that may accrue from the enlistment of dogs into an army. For the perfecting of this system it is essential that a long and thorough peace training be adopted, for it cannot be left to the last moment with any hope of being successfully employed. Doubtless this subject, like all others, has another side to it, and I shall be glad if you will be so good as to give it a full discussion, as thereby I shall hope to learn much which may be of use in enabling me to carry out further trials.

At the close of the lecture two dogs were exhibited, one carrying pouches filled with 80 rounds of ammunition, and the other with a pocket under the ear for despatches.

Captain CURTIS, R.N.: I am very glad to have this opportunity of relating what the doctor in the Turkish Contingent at Smyrna told me. He said, if the search parties had had a dog when sent into the mountains to look for "Simon," and his gang who kidnapped him in 1854, they would have found him. The robbers who shifted their quarters at night and hid up by day, more than once heard these arch parties talking in close proximity to their hiding place, and Simon, with a drawn dagger, threatened instant death to the doctor if he spoke. If the search party had been accompanied by a dog of some kind there can be no doubt that the whereabouts of the doctor would have been very soon discovered, and he would have been rescued from the hands of his captors, instead of being deprived of his liberty for so long. Eventually the doctor was ransomed, some shepherds, tempted by the reward of 200*l.*, having cut off the head of Simon. About five or six years ago I wrote to one of the papers, and related what the doctor told me; however, they did not think it worth while to publish my letter, and I am very glad to have this opportunity of mentioning the incident here, because it may lead to soldiers employing dogs when they are engaged in similar work to that which I have described. At the time of the Zanthium Expedition of 1844, although we tried to coax them in every way to come to us, we could not at first get any native dogs, notwithstanding the mutual attachment which exists between Englishmen and the canine species. However, three dogs, by giving them the offal of cattle we slaughtered, became friendly with us. One, I remember, was a large wolf-like dog, named "Lion;" you could not get that dog into the house at all, but it guarded the whole of our camp, and, in company with two others of its species, kept off the jackals and also, strange to say, the dogs' former masters. They would not allow any stranger to come near. They used to follow our men down the river bank when pontooning, and come up with them. But, melancholy to relate, when the party broke up and we embarked, we had to leave our four-footed friends behind, as the Captains of the men-of-war in those days, thinking one dog on board quite enough, would not allow the native dogs to come on board ship. We went to Malta, and when we came back again we found that the dogs had remained on the beach all the time we were away. They were literally nothing but skin and bone. Ultimately "Lion" was taken on board after swimming through the surf, the sailors pleading that he should be allowed to remain with them for a little while. They fatted him up, and in a fight that he had with the First Lieutenant's dog, a large Newfoundland, the latter was (although previously the Newfoundland would not let "Lion" come on the quarter-deck) nowhere. Lieutenant H. Temple presented the dog "Lion" to Dr. Watt, Inspector of Malta Hospital; the dog was much admired, and, I believe, ended his days in peace and honourable retirement, for valuable services rendered. The lecturer has, amongst others, mentioned the shepherd's dog. In addition to the

collie there is what we know as the Smithfield or drover's dog, a dog which is, naturally "bob-tailed," and which is a most sagacious animal, and capable of being trained to almost any work. I should like to ask which of those dogs the lecturer would suggest for use in assisting in military and other similar work. I may say I have seen in Scotland three men standing on the road, three-quarters of a mile off their sheep, and the dogs up on the mountain side, and the men, by just waving their hands, would get the dogs to separate their respective sheep. When I have been in command of a coastguard station I have always encouraged coastguard men to have a dog, believing, as I do, that a man with a dog is much better able to perform his duties than a man without a dog. If the man went to sleep the dog would rouse him when anybody came near, so that it is self-evident that it is much better for a man to have a dog accompanying him on his rounds. The lurchers, which poachers mostly use, are very intelligent dogs; they have a very keen scent, and they will retrieve and do the bidding of their masters without a word being uttered. The best way to train a dog to any trick or to perform any service, is to give him something tempting to eat when he has done something satisfactorily which is required of him, as dogs, like their masters, can very often be successfully appealed to through their stomachs. I have been used to give dogs a bit of biscuit as a reward, and I think that is the most effectual way. Do I understand the lecturer to say that the dog should be chained or made fast when with the picket?

MR. BENNETT: For night work dogs should be on the chain, unless you can thoroughly trust them not to bark.

Captain CURTIS: The fine for killing a dog in Turkey Admiral Lord Lyons told me was exacted in this way: the dead dog is held up by the tail, with his forepaws touching the ground, and the fine consists of as much corn as will cover the dog when in that position. That is done in order to prevent people from shooting a dog. Anybody who has been shooting on the Bosphorus knows what these dogs are, and that the only way you can keep them off is to keep the muzzle of your gun almost at the roof of their mouth. You must not turn your back to them, but walk backwards, and if they want the gun let them bite the barrel. When you get beyond their masters' bounds they will retire.¹

Dr. FLEMING: As to the value of the lecture I have no doubt whatever. It is an entirely novel feature in lectures in this Institution to have a new animal introduced for discussion, especially with regard to warfare. The high intelligence of the dog, its extreme attachment to men, and its great docility, should enable it to perform good service to him in war; the question is whether, in our home Army, it would be advantageous to enlist the services of the dog. We know that dogs are peculiarly impressionable to climate; therefore, dogs which were trained in this country might be of little value in the East or in other foreign countries. One great feature in the training of dogs on the Continent is undoubtedly with regard to the frontier service, that is, the dogs are trained to be employed in their own country. Whether dogs trained in this country and sent to South Africa or to India would be as useful, is questionable—I very much doubt it. Dogs are very much impressed by their location, and for dogs to be trained usefully for one purpose they should know the enemy as well as the trainer. I, therefore, think dogs trained in this country to serve with our Army would be very much at fault if they were sent to South Africa and had to look out for Zulus. And then also as to climate, dogs imported from this country into warm climates suffer very much indeed. It therefore struck me when I heard the lecture, that dogs to be useful to an army should be trained in the locality in which they were to be used—there is no doubt about that. I think dogs might be employed as useful auxiliaries in the Army, and, perhaps, the sooner they are so employed the better. With regard to scouting, with regard to watching, and even with regard to carrying, I think the dog might be employed most usefully. Nevertheless, I think the employment of the dog in the Army will introduce a very strange feature; we shall have dogs trained to intercept dogs, and we shall have men engaging in combat along with dogs. It will be rather a curious thing to find fighting dogs introduced among fighting men;

¹ "The Dog," by W. Youatt, is a good book, full of wonderful anecdotes of sagacity and faithfulness. Published by Longman, Green, and Co.

nevertheless, if dogs are to be trained to carry messages dogs must be trained to capture those messengers, and we shall have the intelligence of the dog developed to a higher degree in this direction, perhaps than it ever has been before. I think the lecture is an exceedingly valuable one, and very suggestive, and if dogs can be employed in our Army it will aid us very much, because now-a-days the intelligence of the soldier requires to be very highly developed; and he needs all the assistance he possibly can get from the horse, the elephant, the camel, the bullock, and the mule. Therefore, if the dog can be also usefully employed so much the better for our Army.

Captain CURTIS: Would the lecturer suggest how many dogs should be attached to each company?

Mr. BENNETT: Two for each company.

Rev. THEOPHILUS BENNETT: Would you permit an observation from a clergyman? I am an incumbent in Northumberland, and I have talked to a number of my parishioners on this subject of dogs as they will be, I hope, used in war, and there has not been a person I have spoken to on the subject who has not expressed great approval of the idea. Because, I suppose we shall all agree that the life of a man is more valuable than the life of a dog, and using dogs for various purposes with horses and men, will, I hope, be found to be a step in the right direction. There is another view that we outsiders take of it, and that is that the dog is a much smaller mark than a horse and man. A horse and man can be much more easily hit by the enemy than a dog, and therefore he has many more chances of getting to the far end than a horse and man have. There again I think it would be a very great advantage. There are many other points in which it is obvious that the employment of dogs for war purposes would be of great use. Personally, I have found that dogs are most faithful; they are not likely to be bought over by the enemy: they are likely to be honest—at least, that has been my experience of dogs—they have almost the honest expression in their countenance, and I have no doubt as to any message entrusted to a dog he would be found an honest messenger.

The CHAIRMAN: Perhaps Sir Beauchamp Walker can tell us something about the German Army.

General Sir BEAUCHAMP WALKER: I have not the least idea what the Germans are doing, but I think there is one point which Mr. Bennett has omitted fully to appreciate, and that is the use of dogs as foragers. A good dog on service would be invaluable. When at the Curragh, we had a dog who always foraged about, and constantly brought home food from our nearest neighbours. He got us into continual disgrace, and one had to make the only reparation in one's power, which was to restore something of the same kind in an undisturbed condition. But I once saw an instance of the use of a dog as a forager which was somewhat remarkable. That was at the very hottest time of the Battle of Königgrätz. As we got to the village of Chlum, a hare was started, and a dog belonging to one of the gentlemen on the staff of the late Emperor of Germany chased, caught and killed that hare, which his master immediately stuffed into his wallet. I believe he was the only one of our party who had any supper that night. I certainly had none, and I do not know anybody else who had, but he said the next morning he had had a capital hare stew. I think, therefore, to the uses of a dog in war which Mr. Bennett has so very ably put before us, he might add that of a skilful forager.

General J. T. WALKER: I can perhaps give you an illustration of the manner in which the intelligence of a dog becomes developed under circumstances of difficulty and danger. On the Peshawur frontier I once went into an Afreedi village near Jumrood. The head men of the village brought up a dog for me to look at that they praised very highly. They said it was the one dog left to them, and he was very valuable at night in giving the alarm. All their other dogs had been destroyed by panthers: for whenever a dog barked it attracted a panther to the spot where he was standing barking, and the panther (or leopard) very quickly pounced on the dog and killed him and ate him up. But this one dog, the sole survivor, had gained experience from the misfortunes which had happened to his quondam companions, and whenever he was roused and gave a bark, he immediately bolted off to the opposite end of the village, thus placing a considerable distance between himself and any leopard which might have been attracted to the spot where he was barking.

And so he managed to preserve his life and remain in the village, and continue to be a most serviceable watch-dog.

Captain CURTIS: Perhaps the lecturer will tell us whether the dogs he has selected require a less amount of water than others, because setters, for instance, require an immense amount of water, and therefore it would hardly do to use them in hot climates where there was a scarcity of water.

Mr. BENNETT, in reply: Allusion has been made by Captain Curtis to the faithfulness of dogs. There cannot be any doubt as to the faithfulness of the dog under the most trying conditions, and he (Captain Curtis) gave an example of one of the most trying conditions, I think. With reference to the use either of the collie or native sheep-dog or the Smithfield sheep-dog, the dog I recommend in the paper is the ordinary farmer's sheep-dog. I do not dignify it by the name of collie, which is a higher class of dog, but perhaps not as useful. He (the high-bred collie) has not been in contact with man so much. The farm sheep-dog has lived all his life in close companionship with mankind, and he knows almost what is required of him before he is asked to do it, by gesture even; it is not necessary to speak to him. I think the ordinary Smithfield or farmer's rough collie would be the one to employ as *par excellence* THE war-dog. As to the lurcher, undoubtedly he is a good kind of dog to use; he has speed on his side, and can retrieve, and has many things to recommend him, but it is essential that you begin to train him from the very earliest age, otherwise his natural instincts would be hares and other things of that sort, which might lead him out of the paths of duty. As to rewards, I always give a reward to my dogs after a good performance, and of course a cheery word also goes a long way with a dog. It is not wise to continue giving them biscuits and sugar, otherwise they are always on the look out for it, and do not take sufficient interest in what they are doing. After a time you can get on without these rewards. There is a gentleman (Mr. Lindley) here who, I think, could tell us a good deal about bloodhounds; he has been kind enough to answer many questions for me on that matter. He says with the bloodhound puppy he commences by giving some dainty morsel, but after a month or two that is dispensed with, and the dog is simply rewarded by a cheery word or caress. Dr. Fleming points out that dogs trained in this country would not be of great service in other countries, especially in hot climates. That is of course a drawback to the system, but I understand from people who have taken dogs abroad that pointers and setters and other sporting dogs, although they appear not to be in such good health, yet would perform their work equally as well as at home; their noses are not destroyed; and I think if dogs were exported from this country to South Africa, or Egypt, or India, after a few generations they would take kindly enough to the climate, and could be used in the manner indicated in the paper. It would not be wise to take long-coated dogs to hot climates; they should, if possible, be short coated; but undoubtedly climate is a disadvantage to the employment of dogs abroad. The French in Algeria made use of the native dog; we could equally make use of the dog of the country, and that would be the best method to pursue. Then the Rev. Mr. Bennett remarked that the great advantage in using a small dog is that he is not a mark for the enemy. Of course that is one of the points I have made in the paper. I did not put it in so many words, but a horse and man is an object for the enemy to fire at, but a dog being small easily escapes their notice. Unless the enemy are very much on the alert they are not much taken up with a dog roaming about, or a dog passing for a few seconds before them; they would not probably lay much stress upon it, yet he (the dog) might be the bearer of a very important despatch, and would probably get to his destination, whereas a man and horse might not. Honesty, as I said in the paper, is one of the great points of a farmer's sheep-dog; nothing whatever will seduce him from his duty. In Germany a shepherd will put his dog over a piece of clover to watch it, for they have no hedges in some parts of Germany. That dog will stay there the whole day, and keep the sheep from going on to that piece of clover; and, more than that, if there are growing crops, clover, potatoes, and other things, if the shepherd mentions by name the crop the dog has to look after he will make no mistake; he will go to the potatoes or clover, whichever it is he has to guard; he seems to know exactly, much better than a town-bred person would know, clover from potatoes. Sir Beauchamp Walker has remarked the utility

of dogs as foragers. I did not bring that into the paper; of course dogs are most excellent foragers. I alluded to the fact that they should be employed on foraging expeditions specially as scouts and sentinels, but they could also of course be used for catching hares, rabbits, and other things. But what you really want is a dog that will not go in for game, because otherwise he would be on the look out for these things rather than doing his proper work. That is one reason why the farmer's sheep-dog is better than retrievers and spaniels, because for generations it has been bred in sporting dogs that their sole existence is wrapped up in sport, and it takes time to get them out of that way of thinking. I am hardly in a position to say which dogs require least water. Setters undoubtedly are always going in for water, and they cannot get on without it, but I think short-coated dogs generally drink less water than long-coated dogs. I think that is all I have to reply to.

The CHAIRMAN: Will Mr. Lindley tell us something about the training of bloodhounds?

Mr. PERCY LINDLEY: I am afraid I am not qualified to give much information to the meeting. The experience I have had I put before the lecturer, and I think it has been embodied generally in his lecture. The only suggestion I would venture to make is as regards the age when bloodhounds should commence training. Instead of commencing at from four to eight months I should prefer commencing at three or four; in fact, you cannot commence too early. The instinct seems to be born with them to use their nose, and if you try to keep that back you simply spoil your hound at once. I have commenced training young hounds over woodland at three months, and I find the almost innate desire to track man will altogether overcome any desire to track say a hare or deer, even doing it without any aid. You start him by letting him follow a man some 100 yards, when the man gives him a morsel of food. The next lesson he will go 200 yards, let him see the direction in which the man is going, and get his reward. At the third lesson the man will go out of sight, and in three cases out of four the dog will find his man. It is very simple, you only have to multiply that lesson, and in due time you can get him to go three or four or perhaps five miles. You can then train him to go back on his own scent. He will take out a message and will bring back a message. I have a seven-month old puppy now that does that. Again, at night he will distinguish the approach of anybody. He will tell me sometimes at 200, sometimes at 300 yards; that, of course, depends upon the wind. He will work on a down wind to 300 yards. The bark has to be done away with. You get your growl, and I suppose that growl ought eventually to be developed into simply a look. Apart from those two points, I must say I have not given the bloodhound any trials in the direction indicated by the lecturer, but so far as intelligence and faithfulness are concerned I think the bloodhound would answer most of the requirements pointed out by the lecturer.

The CHAIRMAN: Ladies and gentlemen, we are really very much indebted to the Veterinary Department of the Army. Last week we had an able and important paper read by the Principal of that Department; it certainly had not a very attractive title, but the paper when read proved to be not only instructive and important, but also extremely interesting, and it led to a discussion which elicited a great deal of valuable information from gentlemen conversant with the question before us. It also led to an important result, and that was a promise from Dr. Fleming that he would favour us on some occasion (not very far distant, I hope) with another paper on the same subject. To-day we have had a paper read which I cannot describe as unattractive in its title, because most of us—I think I may say all of us—are very fond of dogs, and we could not fail to be much interested in learning how dogs can be utilized in the various operations of war. Mr. Bennett, I think, has enlightened us on that matter in a very able way. He has told us how dogs may be used as auxiliary sentinels on outposts, as scouts during a march, and in various other ways, and he wound up by explaining how dogs may be trained for all these various purposes. The subject certainly is a novel one, but on that account it is not the less acceptable in this Institution, because I may say that we here welcome new ideas in the hope that by discussion we may be able to elaborate them into some tangible form which will lead to practical results. I am sure we are all very much indebted to Mr. Bennett for what he has told us this afternoon, and I think I shall

be complying with your wishes in tendering to him a cordial vote of thanks for what he has done.

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“Kolnische Zeitung,” and from several private sources.

Friday, March 22, 1889.

LIEUT.-GENERAL SIR H. EVELYN WOOD, *B.C.*, G.C.M.G., K.C.B.,
in the Chair.

THE HOME DEFENCE BILL AS AFFECTING THE VOLUNTEERS.

By Lieut.-Colonel F. W. HADDAN, 4th Volunteer Battalion, the
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Introductory Remarks.

I WISH to offer a few preliminary remarks as to the reason for selecting the title I have chosen for my paper.

All are probably aware that the Bill introduced in 1888 was entitled the "National Defence Bill," and that it contained certain clauses affecting the Volunteers, which clauses were subsequently withdrawn, and in consequence has arisen the *raison d'être* of the paper I purpose reading to-day.

In any case it would be manifestly out of place, especially in an Institution such as this, for me to attempt to discuss the details of "National Defence," which includes the naval services of our Fleet, and the duties of the Army at large, subjects which I would not profess to be able to handle.

I have therefore confined myself to the question of the dropped clauses, and limited myself to what concerns the Volunteers solely, and have therefore with this view entitled my paper "The Home Defence Bill as affecting the Volunteers."

1. That great divergence of opinion exists as to the probable effects of the recent Government proposals is sufficiently manifest; but to which side of the controversy the "right" belongs is not yet by any means assured.

2. The object of this paper is, therefore, not so much to set forth my own individual views as to initiate a discussion on this very important subject, and so enable all shades of opinion to be expressed, and that in a manner not contrary to discipline and the regulations.

3. That no definite opinion of the Volunteers as a whole has been obtained is certain, and I cannot but feel that the abstention from agitation on this matter, one way or the other, is about the best proof of discipline and self-control that the Volunteers could have afforded.

I, myself, as doubtless many others, felt the propriety and necessity of awaiting a request from the authorities in regard to my opinion, as representing my battalion; and it is only because no such step appears to be contemplated by my superiors that I have sought this opportunity of raising a discussion on the subject.

4. I strongly deprecate the handling of subjects such as this by tactical societies, which are formed for the distinct purpose of studying tactics and practising Kriegspiel. A recent case at Liverpool affords an example of the troubles that may ensue from such societies attempting to deal with ordinary matters of a military nature.

5. We are of course all aware that there are, in our branch of the Service, several Members of Parliament who have not hesitated to express their views, and who, probably, may have considered that because the opinions advanced were *theirs*, or as representing their own particular battalions, they therefore necessarily represented the opinion of the whole Volunteer Force.

6. What may truly represent the views of a "gentleman-private" or "class" corps, may be utterly unsuited to and divergent from those of a "working-man" or "mass" corps, and the same difference of circumstances may be found in the case of "country" as distinguished from Metropolitan or "town" corps.

7. Under such circumstances, therefore, it seems most desirable that all sides should be heard, and I wish to state distinctly that I do not attempt, or wish to endeavour, to settle this question according to my own views, which I express simply as my own, and in order to found a groundwork for argument whether for or against me.

8. Whatever opinion is found to prevail would be loyally adopted by me, for I hold that the majority should always exercise their strength when their case is proved.

9. With these provisos, I will now proceed to state my views as to the wisdom and policy of the course taken by the authorities, in suggesting that the Volunteers should allow themselves to be placed under new conditions of service, as originally proposed in the National Defence Bill, 1888.

10. The first intimation received of the proposal was when the National Defence Bill was submitted to Parliament, and it contained certain clauses whereby the present conditions of volunteer service would be considerably altered. A short discussion only ensued in Parliament, when a few members of the House, who are also Volunteer Officers, gave their opinions for or against, and a few other Officers wrote to the papers; and finally the clauses were withdrawn without, as I contend, the general opinion of the Volunteers having been in any sufficient way ascertained. Thus heartburnings have been caused which might have been avoided had a somewhat different course (such for instance as a preliminary confidential circular to Officers Commanding) been adopted.

11. The authorities may, however, with some considerable show of reason, plead that they were justified in taking the course they did, seeing that in our recent Egyptian troubles they had offers of service

from several Commanding Officers to place their corps at the disposal of the authorities.

12. That they were ever seriously meant I take leave to doubt ; I would characterize such offers as unsound spasms of frenzied zeal, or as an attempt to "advertise" a corps. Had an offer so made been seriously entertained and accepted, I venture to assert that it would have been found to be a mere flash-in-the-pan.

13. To offers such as these may therefore in a great measure be traced the circumstances under which the measure was introduced into Parliament.

14. Whatever the faults of the past, we have now to deal with the case as it stands, and the point I suggest for discussion is : "Would the Volunteers as a whole be willing, *and able*, to give their services in the manner suggested in the Home Defence Bill, and even if they were, would it be desirable, in the best interests of the force, *quâ* Volunteers, that they should be so called upon ?"

15. As regards the personal willingness of every man in the force I have no shadow of a doubt, but as regards his *ability* I have very grave doubts, for as a business man myself I am only too well aware of the objections raised by many employers of labour to their assistants being connected with the force, and even when they are known to be so connected, not the slightest facilities are afforded, in very many cases, *if* volunteer duty at all clashes with business.

16. It is to this latter cause that I attribute the great difficulty of getting men to the ranges for musketry practice, which under present rules must necessarily take place in daylight, and therefore (except in some cases on Saturday half-holidays and bank holidays) in business hours.

17. To employers of labour, such as the foregoing, I would point out the unenviable position in which they would be, should no Volunteer Force exist ; and I say, broadly, that it is not only their duty as citizens to aid by every means in their power their patriotic employés, but that, taking even the most selfish motives, it is their distinct interest to do so, for if the Volunteer Force be not supported, and greater facilities given to its members, the time may come when either the Army must be increased, or the militia ballot enforced, either of which will inevitably affect their pockets ; or else a Home Defence Tax may have to be imposed especially on them, they being not only unwilling to aid in the general burden of duty to the State, but for positively acting as obstructives to others more nobly, patriotically, and generously inclined.

18. In these days of an enlightened press, and of publicity and advertisement, I venture to assert that no firm of any standing would dare to say out in the face of day that they would not allow their employés to be volunteers, even under the Home Defence Clause ; but I am equally sure that there are many firms who *feel*, and *sub rosa* *act*, in this manner ; and it is only exposure that will remedy this sad trait of money-grubbing before patriotism, and which has perhaps justified the remarks of foreign critics that we are "a nation of shopkeepers." I have seen it stated lately that some of Colonel

Laurie's men have had to resign, owing to their employers refusing to allow them to remain as volunteers. I should like to know the name of such firm, which I would publish in orders and in the press.

19. The foregoing is, however, but one branch of the "ability" question.

20. Volunteers are necessarily civilians first and soldiers afterwards, and probably 95 per cent. of the force as a whole are directly engaged in professions, businesses, or occupations on which they and their families are actually dependent for their livelihood.

21. To interfere *unnecessarily*, or even to give men cause to *think* that their means of livelihood will be, or even may be, interfered with unnecessarily, is a very serious matter, and it is on this rock that the Government proposals have for the moment suffered shipwreck, mainly, as I believe, by reason of the Officials not having sufficiently informed themselves of the opinions of those most interested. It is true that there was the general safeguard that no man at present in the force was obliged to go under the new Act, but only those who desired, or those now joining the force.

22. The mere *power* to call out the Volunteers as proposed is nothing, for it may be safely assumed it would never have been put in force unnecessarily; but to make this power of any practical utility, the men would have to be exercised, in peace-time, in the performance of the various duties they *might* one day have to perform in real earnest. It was therefore felt by some that this power to call out might, to a limited extent, be used as a lever to get men to undertake duties in peace-time which might be of the greatest utility and advantage to them, but which they could not readily adapt themselves to, or get their employers to assent to, by reason of the nature of their civil avocations.

23. The withdrawal of the clause from the Act cannot but act prejudicially on the force in the eyes of the general public; for although the people of all classes are so intimately connected with it, they are not aware of the whole conditions, and they will be apt to think that the Volunteers are shirking a proper duty, which the authorities have asked them to discharge, and this in the face of the knowledge they possess that a considerable sum has lately been awarded as capitation grant; and it cannot but have a marked effect, unless properly put before them, on the praiseworthy effort of the Chief Magistrate of London to raise a fund for the better equipment of the Metropolitan corps, as to the absolute necessity for which there is no doubt whatever.

24. No Volunteer worthy of the name *is* desirous of shirking any duty compatible with the due discharge of his first duty to his family and himself; and the very desire of some to show that they are not so shirking may, not improbably, lead to their engaging in a matter whereof the possible consequences may not be apparent on the surface.

25. It is assuredly no part of the Volunteer's duty to undertake the work of the Army proper, nor to oust the militia, which is the constitutional force of this country, and any steps tending in this

direction must, in the true interests of the force, be carefully watched.

26. Doubtless the authorities, with a praiseworthy striving after economy, thought the time had come, after the recent boon of 60,000*l.* a year increased grant to the force, to ask something more in return than the greater stringency of musketry practice; but the Volunteers, on their side, felt and knew that the sum granted only makes up the arrears of many years' neglect, and can only be counted as a payment *for past services and liabilities*, and as an earnest of better things to come. In that light it was regarded, and due thanks and praise have been given to the authorities for the boon they granted.

27. Supposing the clause of the new Defence Bill to be adopted by the force, I should certainly expect that my men, by adopting fresh obligations, should most certainly be thoroughly equipped and fitted in return, to take their place in the field *if and when required*. The present Act contemplates and sanctions the payment of three guineas to each man, for equipment, if called out, and I should want this money to be granted *now*, so that the necessary preparations might be made in peace-time, and the men trained in transport duties, camp equipage, the use of entrenching tools, and so on.

28. Quite enough (if not too much) has already been asked at our hands. We have given our time, *and our money*, whilst others, on whom a duty devolves also, have given nothing. It is not too much to ask, if the pressure of taxation be felt to be too heavy to warrant the increase of our standing army, that, at least, those who have borne no part of the State's burden should first be called upon to suffer in purse, if they will not in person.

29. *Then*, supposing the necessity to arise, by all means ask your Volunteers to make fresh sacrifices, but in so doing be not niggardly in recompensing them for the increased duties and liabilities imposed, especially when it is well known, all the world over, that the force is the cheapest (and probably ever will be the cheapest) that any country ever possessed, founded entirely from patriotic motives, and in no sense mercenary, and but for which some form of conscription, so hateful and antagonistic to an Englishman, and so baleful in its effects on our neighbours, would have to be resorted to.

30. We want no pay whatever (except we be called on active service), and we cordially sympathize with every effort made to render us better soldiers and more fit to take up and perform our duties should the necessity ever arise.

31. More especially do I appreciate the views of H.R.H. the Commander-in-Chief, expressed in the letter of service to the new Volunteer Brigadiers, that to be prepared for all eventualities we must *practise in peace-time*, and have everything in readiness.

32. How to practise mobilization, even on a small scale, is, however, a very difficult matter for us, for the *necessity* which this involves of interfering with business avocations has not been sufficiently made known to civilian employers of labour; and they would undoubtedly resent, in many cases, the desires of their people to avail themselves

of the chance of practising mobilization, because they would not appreciate the importance of the issues involved.

33. Many of the men who now go to Aldershot, or to camps and marching columns, give up their *only* holidays. Here, of course, the employer cannot interfere. It, however, speaks well for the rank and file that, in these days of express speed labour, thousands of men are found willing to give up their *only* days of rest to perfect themselves in their duties as soldiers. It must, however, be borne in mind, that all cannot obtain their holidays at the fixed times of camps and Aldershot (in the early part of August), and the authorities would do well to consider whether men, who are quite willing to give up their holidays *whenever* they arrive, could not be accommodated at military stations, even if only a company could be got together for the benefit of association with the regular forces, and the learning of camp routine, and outpost *and outdoor* duties.

34. In fact, the authorities must endeavour to make their offers more elastic and suited to the capacities and abilities of the Volunteers, for to expect or hope that any *considerable* number of the force can ever be assembled, even for a week, at one *fixed* period, shows a marked misappreciation of what the Volunteers can possibly perform. In this connection I cannot too strongly urge the advisability of having attached to the Headquarters Staff the very smartest Adjutant of Volunteers that can be obtained, so that his knowledge might be made available, and we should thus doubtless obtain many reforms, the necessities for which are unknown to the authorities, guided as they are entirely by the opinion of regular Officers, who, with the best possible intentions, have, so far as our *interior economy* is concerned, but a very superficial knowledge. I wish, at this point, to remark that I have not the slightest intention of conveying any impression that the regular Officers (to whom we owe so much, and represented as they are by our gallant Chairman, than whom a better friend the Volunteers never had) are not doing all they can for our branch of the Service. It is only in the matter of *details*, which tend to make the machine move smoothly, that I think a regular Officer who has served as an Adjutant might possibly prove of great assistance.

35. Assuming that the recalcitrant employers of labour, either by means of the public press or by the threat of a special Home Defence Tax, become more patriotic in their bearing towards the force, there would yet remain to be solved the problem of whether, in the interest of the force itself, it is desirable to proceed on the lines set forth by the authorities.

36. We have already a special Railway Corps, recruited at Crewe from the London and North-Western Railway, and another is just being formed in London; though in this latter case the additional railway companies are to be attached to an engineer corps, raised under ordinary conditions. Here we have a direct example of men serving in the same battalion under different conditions of service.

Again, in the Post Office Corps, we find the same thing. Some men actually have been on service and some liable to go, and with

the prospect of deferred pay—whilst others serve under the ordinary conditions ; and no ill effects are visible.

37. Some good friends of the volunteer movement maintain that it would be fatal to its continued prosperity to establish *two* sorts of service ; that is, one for “active” and one for “passive.” That example already quoted does not, however, bear out this view. I do not find that in any of these corps the men are thought more of because they can engage for active service, nor do I find in the opinion of the general public, or the Volunteers themselves, that these corps stand in any different position to the general run ; whilst I most cordially support their adoption of the chances offered them to become, by reason of their special avocations, of still greater service to their country.

38. In the Army proper we find *corps d'élite*, such as the Body-guard, the Engineers, and the Royal Artillery, and to my mind it is only human nature to expect to find similar conditions in the Volunteers. I would, therefore, let every corps do as it pleases, in offering to go under the new Act, feeling assured it will be done for the common welfare of the country, and that no stigma would attach to any regiment, if it be so circumstanced as not to be able to respond as freely as others to the new demand.

39. I would, however, as I have before stated, expect that the corps so circumstanced as to undertake the new liabilities should absolutely be equipped and fitted out by the authorities to enable them to perform their new duties if called upon.

40. That *all* will respond, should ever the call of duty be heard in earnest, I firmly believe ; but I would not myself stand in the way of one single man offering better service to his country, for *fear* of creating two classes of service amongst the Volunteers, especially as in the cases already quoted where a *dual* service does exist, not the slightest inconvenience is found to accrue.

41. For such corps, or such men, however, I certainly claim the greater attention and support, on the grounds of mere commercial morality. If higher duties are exacted, *and can be given*, by all means have them, *and pay for them*, according to the ordinary rule of supply and demand.

42. I shall certainly feel no sense of envy or disappointment supposing my own battalion were unable to do as much as others. On the contrary, I should know that my men, weighing their just responsibilities, either do or do not desire to undertake fresh duties ; but whatever the upshot, I should feel convinced they had acted on judgment *and not impulse*, and what they have undertaken or did undertake, they would assuredly carry out.

43. It may not be out of place, in conclusion, to remark that the Yeomanry are now under the Act, and the Royal Naval Artillery Volunteers also, and they can be called out for actual service whenever the Royal Naval Reserve is called out, such Reserve being to the Navy what the Militia represents to the Army.

The CHAIRMAN : Before calling upon Officers to address the meeting I should like to refer to three paragraphs in the paper, because I do not think it is much use discussing things which are not facts. I refer to paragraphs 10, 33, and 34. The lecturer has pointed out to us as part of the last paragraph, 34, that it would be advisable to attach our smartest Adjutant to the Headquarters Staff of the Army in order that the Headquarters Staff might be closely posted up as to the feelings of the Volunteers themselves, and might be able to inform the Commander-in-Chief how much they can do and what they ought not to be asked to do. But, gentlemen, we have already got that machinery, and, I think, existing in a much more perfect form. Whether we take advantage of it is another question. We have a General Officer in command of each district, and it is their duty to do everything they can to assist the Volunteers, to become closely identified with them, and to know the wishes and wants of every corps. Assuming, for a moment, that we take our smartest Adjutant from the London Scottish, or the Artists, or the Westminster, he would only represent that one corps out of the whole district. In the district containing 18,000 Volunteers, from which I have recently come, there are many corps, and all with different wants and requirements. I belong myself to a corps which has gone into camp for six days in nine successive years. They did not find the difficulties which other corps do; but if they were factory people, and the factories had to stop work, it would be actually impossible that they could do it. If there is a mistake, as implied by the lecturer, I do not think that would be the way of mending it. I think the only way would be that we, as Generals ourselves, should take much more interest than we have done in the Volunteers. I think the lecturer has made an error in these three paragraphs in supposing that we do want any Adjutant, however smart, to inform the Adjutant-General what your wishes are; and if he tried to do it I fear he would not give you, and he would not give us, satisfaction.

Colonel HOWARD VINCENT, M.P. : Sir Evelyn Wood, I think all Volunteer Officers who are present will agree with me that the force is very greatly indebted to Colonel Haddan for having prepared so valuable a paper. He has laid his views before this meeting with very great clearness, and I have no hesitation in saying that they are views which are shared by a considerable proportion of Volunteers. As he rightly says, paragraph 14 is the most important one of his whole paper, and he suggests this point for discussion: "Would the Volunteers, as a whole, be willing and able to give their services in the manner suggested in the Home Defence Bill, and, even if they were, would it be desirable, in the best interests of the force, *quâ* Volunteers, that they should be so called upon?" I should like, with the permission of the meeting, to say one word upon that paragraph, and upon the conclusions which one may draw from it. But, in the first place, let me point out that which may not have been noticed by all, namely, that there is no such Bill now before the House of Commons as "The Home Defence Bill." There was last year the National Defence Bill, in which the clause to which Colonel Haddan has so well referred, was incorporated. The clause affecting the Volunteers was taken out of the Bill, and the Bill without the volunteer clause passed. But it is not at the present time before the House of Commons. I myself am anxiously hoping that it will be re-introduced in some form or another. In saying that, of course I am only representing my individual opinion. I must be careful not to fall into the error that Colonel Haddan suggests some of us in the House of Commons have fallen into, namely, of representing our individual views as being the views of the whole force. Having taken very great interest in this subject, and differing from some of my colleagues in the House of Commons as to the feeling of the Volunteers in this matter, I have no hesitation in saying that we are greatly indebted for this opportunity of discussing it, and we much appreciate the presence of Sir Evelyn Wood, General Fremantle, Colonel Stracey, Sir Havelock Allan, and other members of Parliament who take the greatest interest in the Volunteer Force. Personally I answer this question in paragraph 14 of the paper very strongly in the affirmative. I believe that the Volunteers would, as a whole, be willing and able to give their services in the manner which was suggested by the National Defence Bill of last year, and I think it would be very greatly to the interests of the force if they were called upon to do so. Under the present condition of things, that is, the

Volunteer Act of 1863, Volunteers can only be called upon when there is actual danger of invasion, and that would mean, I take it, when the enemy is off the coast. There is nobody who has had anything to do with the Volunteers, however great reliance they may place in the volunteer movement, and whatever confidence they may feel in the constitution of the force, who does not recognize that some weeks, at the very least, of preparation will be absolutely essential before the force can be ready to take the field. That being so, I do think it is most unwise that the country should be limited by the present Act of Parliament to calling upon Volunteers until the hour of preparation is over. I think that there would be no danger whatever if the clause of last year had been allowed to pass. No Volunteers who are now serving would be required to enter into any fresh engagement unless they were willing to do so. I feel strongly, and I desire strongly to support what Colonel Haddan has so well said, that the fear of creating two classes in the Volunteers is purely mythical. I do not think the smallest reproach would attach to any single individual who found himself unable, either from family services or professional employment and other causes, to give that greater amount of service which was contemplated by the Act. I believe a very large proportion of employers of labour in this country fully recognize the enormous advantage of the Volunteers, an advantage not only in a military capacity, but a civil and moral advantage. One firm is very much in my mind at the present time—there is no reason in the world why I should not mention the name—Messrs. Shoolbred and Company, who support the Volunteer Force in a most liberal and generous manner, who equip and support a company entirely at their own expense; who rent a range for it; who engage instructors for it, and do everything they possibly can to promote the efficiency of this company—doubtless, in some measure, from patriotic motives, but also, I am quite sure, because they believe, and their experience teaches them, that the very best men in their employ are those who devote their leisure time to physical development rather than to the dissipating amusements which are open to them in other channels. And if I mention the name of this firm it is by no means because they are superior to other industrial firms—for there are numerous business houses, not only in London but in other parts of the country; in Yorkshire I know several, in Sheffield several, who take exactly the same view, that the healthy recreation of their employés is a matter to them of very serious consideration. They know it is much to their advantage for their men to have their emulation fired, their honourable ambition aroused by military exercises, rather than that their energies should be sapped by pleasures impairing their efficiency for business. Now upon this National Defence Bill of last year I took the opinion of several large employers of labour—some of the largest firms in Yorkshire, employing 10,000 and 12,000 hands, and from all I received the same verdict—that they did not see anything in the provisions of this Bill which would prevent their retaining the services of any single individual. Holding, then, the views which I do, knowing from personal experience and from having taken, in some measure, the feeling through the Captains of companies of the Queen's Westminster Volunteers, which I have the honour to command, it was upon that ground I strongly supported the volunteer clause in the Bill last session. I hope that there may be a full and free discussion, and I have extremely little doubt that the result will be to show that this meeting and a very large proportion of the Volunteer Force cordially agrees with Colonel Haddan, and is most anxious to support the Secretary of State for War, and our most excellent friend General Fremantle, the Deputy Adjutant-General, in every step, in every measure which may be undertaken to improve the efficiency and increase the utility of the Volunteer Force.

Major W. E. HEATH: I have been, Sir, for rather more than twenty-nine years in the force, and from my experience I believe that you cannot ask the Volunteers for more than they are ready to give, within their ability. I am only going to speak on one point on this occasion, as I agree with the lecturer on all points. I believe that no Bill introduced into Parliament would be perfect unless provision were made in it for the wives and families of men whilst engaged on active service, or away from their employment, as well as a provision for the results of active service when your men are killed or wounded. We must remember this, that men taken for active service would be taken away from their employment, and there is no doubt that

90 per cent. of the Volunteer Force are mechanics, or employés of one sort or another, entirely dependent, with those belonging to them, on their earnings from week to week. The Government must look this fact in the face, *that in the absence of the breadwinners of the families, they will have to provide for those families.* I am perfectly certain of this, that it would take all the go out of the men if they knew that whilst they were fighting for their country their families were left dependent on charity of any sort. Those wives and families must feel that they are entitled to demand support from the Government, and the men must *know for a certainty* that their families will be taken care of in their absence by the 39 millions—for that is what it comes to—of the stay-at-homes, and the amount of allowance settled beforehand by Act of Parliament, thus giving the men the option of resigning during peace if the terms were not satisfactory. I have nothing further to say; I know for myself what I should do, and I know from thousands of men who have passed under my control during nearly thirty years, what would cement their patriotism, and I also know that you could increase your force by hundreds of thousands if you would only have something definite on paper, so that a man who volunteers might know that when he left his employment and his home to defend all the rest of the people who *did not go away*, and all the property of *which he owns so little*, he should be assured that those whom he left at home would be properly cared for, and not treated as paupers, or left to the tender mercies of the broker or relieving officer, or relegated to the workhouse.

Colonel MACFIE: I rise with great diffidence to speak in such an audience as this, but I may say I joined the Volunteer Force in 1859, and have had, I think, as much experience as anyone in this room. For nine years I served as a private, and for the remainder of the term I have been an Officer, and for seventeen years a Commanding Officer. I entirely dissent from the view put forward by Colonel Howard Vincent, and my reason for doing so is explained in the 20th paragraph of the paper read by Colonel Haddan, namely, that "Volunteers are civilians first, and soldiers afterwards," for that is what the War Office and the authorities are very apt to forget. It is all very well to say that when they are called out for active service those who remain at home should pay for their wives and families, but I have known many cases of men being asked to resign their employment because they went for a week into camp. Such cases do occur. Colonel Howard Vincent spoke about large employers of labour, and mentioned the name of Messrs. Shoobred. Of course it is very patriotic of Messrs. Shoobred to pay what they do, but I think they should not be called upon to do it—no one should be called upon to put his hands into his pockets in that manner. The country generally should provide for the Volunteers, and it should not be left for private firms to do it. It is all very well for large employers of labour to take such steps, but take the case of the small employer, who has but two hands to do the whole work. One of them goes away for a week's camp, and the other is left to do the work. Then if he goes against the will of his employer he is turned out of his employment or threatened, and he cannot go to camp. I think the difficulty is very great, and we ought to recognize that the men are civilians first and soldiers afterwards, which we do not sufficiently do at present. I am not at all criticizing Colonel Haddan's paper, because in my experience I never came across a paper written so much in the interests of the Volunteers as this one. I may mention that I have pointed out to Colonel Haddan a mistake occurring in the 4th paragraph, which he has promised to set right.

Major TODD, Middlesex Artillery Volunteers: The question before us, I take it, is the defence of the United Kingdom, and therefore I hope you will allow me to range a little further than other speakers have done in maintaining that the very first thing that should be done is the strengthening of the Navy, so that our food supplies may be all right. At the same time, seeing that it will take three or four years before we can get the vessels that are required, is it not madness on our part to leave our people unprepared for war, or to defend their country from invasion? Are we going to be disgraced again, as we were in the Crimean War, having to hire German soldiers to come here and defend our women and children.¹ I think it was the most disgraceful thing I ever saw in

¹ A misapprehension which was corrected by the Chairman.—ED.

my life. I remember when I went with my father to Folkestone I saw German soldiers doing Englishmen's duty. I said to my father, "Who are these men?" I had been used to seeing our long-service soldiers there, but when I saw these men I was astonished. My father said, "These are German mercenaries." I replied, "I will do all I can when I get to be a man to alter that state of things," and I have been trying to do so since. That is why I joined the Volunteer Force thirty years ago, and assisted in forming what is now a very large battalion. I brought my sons up in the same way; they were both commissioned when they were seventeen, and passed through Woolwich and Shoebury. I then took them to the infantry barracks of the Coldstream Guards to serve their time there, so as to be able to drill their men, for I don't believe in Officers taking their men in Hansom cabs, when ordered to march them from one part of town to the other, but believe they should be able to train their men at infantry drill, and so move their men as infantry, as well as at their artillery work. I then passed them through the cavalry, so that you see I have some strong motives in speaking in the way that I do at the present moment. You will excuse my warmth if I say that I do not consider an Englishman is worthy the name of an Englishman unless he belongs to some service. When we started the Volunteer Force we worked hard; we trained our fellows in boxing, fencing, and in riding, so that we were able to get up the Royal Military Tournament, which I had the honour of promoting with General Burnaby, some ten years since, and which has done so much towards feeding and schooling the orphans and widows of our soldiers. I hope the women of this country will refuse to have anything to do with men who will not only say they are prepared to defend their country if it is attacked, but will prove that they are prepared to defend it by the practice and study of drill and of the science of war, the same as a man should be able to box in order to defend his own women and children. That is my way of looking at it. We are coming to the times of the survival of the fittest, and it is time the House of Commons looked at this question from that strong point of view. Instead, we have the waste of time which is going on in the House at the present moment, and which is a disgrace to the country. Unless we are back to back in this matter we shall be like the single reed, and not like the bundle of sticks. "A house divided against itself will fall," therefore all classes of the community should work together to see that the country is prepared. Never mind the expense! What has the Treasury to do with it? We are the taxpayers; we have been giving our time to the Service. We have been told that Messrs. Shoolbred give money to support their company; God forbid that this should happen in my regiment! I would refuse to find the equipment. It is a disgrace to the nation that we should be called on to equip our men. We are not beggars, and will not accept charitable contributions; let the country find the guns and equipment, with ranges, &c.; we give the time and labour. I say the whole of the Volunteer Force should be first equipped, and then the Navy can go on building in the meantime. Why should we be protected by the Navy? As Englishmen we are not worthy the name if we are not prepared to defend our shores. In case the Navy got the worst of it, as might happen, and the enemy come on shore, then how shall we protect our shores? There has been an immense amount of talk about defending the heart of the country, meaning London, by two army corps. We see these two army corps on paper, but we have never seen them on the ground. But even supposing there are two army corps to defend the heart of the country, I defy those two army corps to defend our shores. When I was a pupil of Langham's, and also practised with fencing masters, did they tell me to defend my heart as the only part of my anatomy to be defended? Certainly not. They taught me to defend any part of my anatomy that might be attacked to the best of my power, therefore we must be prepared to defend every part of the anatomy of our country in the same way. You must equip your men, you must do all this sort of thing. And then look at the good effect the practice of drill and discipline has upon the men themselves. It has done a great deal of good; many men who would have been very bad characters are now first class men, simply through passing through the Volunteer Force. And then look at what these men are able to do. I don't say it out of mere brag, but this year I took the Silver Cup with eighteen of my young men, that I had only had two years in my battery. They took it for exercising a 40-pr., although we had to compete

against the arsenal men who came from Woolwich. I say if you will only train these men you ought not to put them to a penny expense; it is good enough for them to give up their time and their leisure, and to go and do the work, and prepare themselves to defend the country. We are told that the country is in danger; each party in politics tells us so; each party in the country tells us we are dependent on the Navy. They say you are in danger. This would not be the case if the public would only look at the question calmly, and if it were put before them by the authorities in a clear and sound manner, that every man, I would say every male above sixteen years of age, capable of doing duty, should be called upon to join the Volunteer Force, and pass as efficient. The fact of having to do twenty drills a year is no great hardship; my men do 100, and I do it with them. If everyone should be compelled to do twenty drills a year, and to pass also for shooting, you must then have butts all over the country, the same as our forefathers had at the doors of the people. I don't mean a single butt, like that at Wormwood Scrubs, where they put a prison at the end of it to stop shooting there. I say you ought not to abolish a single butt, but you should increase them all over the country, where the people may go and have some practice before they set out on their work in the morning, or after they get home from their work at night, because I find that the men are willing to get up at five o'clock for the purpose, if they get the chance. We must make every man pass his examinations in drill and in the use of the Morris tubes, and get the butts in the meantime. If you will only do that, we shall always be able to meet our enemy. Let the Army go abroad, let them go to our coaling stations, Colonies, send them anywhere you like, because we should have our men ready at any spot that might be attacked; we can defend our own shores, and if we cannot defend them, we deserve to lose them.

Lieutenant-General Sir HENRY HAVELOCK-ALLAN, *V.C.*, *M.P.*: I have been very much struck, Sir, by some remarks which fell from the last speaker, and in nothing do I agree with him more entirely than in that which I have ascertained by my own experience, that the time has almost come when you have got to the limit of what the Volunteers may be expected to do as to putting their hands in their pockets. I believe that there is no limit whatsoever to the patriotism and the good spirit that they display, and also the extent to which they are anxious to avail themselves of every possible opportunity of military instruction. During the short time that I have had the honour of holding my present post I have found that there are no difficulties raised on the part of the Volunteers, although there may be on the part of the authorities, who to a certain extent do not appear to appreciate as much as they might do the advantage of placing facilities in the Volunteers' way which the Volunteers themselves desire in order to make themselves militarily efficient to any extent possible. It is in connection with that that I should like to say that I think the fact has not sufficiently impressed itself on those in authority that the time has now definitely come when, if the Volunteers are to take part in the organization of this country for national defence, when the regular forces may be withdrawn under any circumstances, such as the last speaker has foreshadowed, you cannot expect the Volunteers or their Officers or supporters to do much more pecuniarily than they have already done. Men and Officers are ready to give their time and their leisure, they contribute greatly in money also, but I think, if they are to be organized, as we hope they are, effectively as field brigades, one of the first steps towards that should be that the Secretary of State for War should recognize that every article of their equipment ought, as far as possible, to be supplied to them at the expense of the nation at large. How is it possible, for instance, for their carriage to be organized so that they can go out and move in brigades unless a little more liberality is shown in the matter, and inducements are held out to people to provide the men with the necessary horses and carriages? As regards equipment, one difficulty is that you cannot absolutely in certain months get the battalions in brigade together at all, simply because they could not undertake the railway journey because they have no great coats. You cannot ask a man to sit for hours in a railway train in winter without a great coat. Then in the matter of leggings, and boots, and ammunition-pouches, and other facilities for carrying ammunition. I think all those things are matters of absolute necessary equipment and ought primarily to be supplied by the Government itself. As regards one point, perhaps Colonel Haddan would

permit me to say I think he has fallen into some error. Without speaking of a matter which might be supposed to be secret, I was one of those entirely opposed last year to the National Defence Bill in the shape in which it at first stood: and although I for one did not oppose the Secretary of State for War upon it openly, I had no hesitation in expressing to him the views which I know are held by a great part of the Volunteers in the North of England, namely, that if the compulsory clauses as they then stood had been carried out, the effect on the Volunteer Force would have been that they would probably have led to the disbandment of half the force. I think Colonel Haddan goes to this point, that under a future modification of this Bill—which we hope may be brought in, perhaps this year or the year after, when the authorities have had more experience of the responsibilities of volunteers under the new organization into mobile brigades—some of the offensive and harmful features of the late Bill may be struck out, and a better Bill framed. The first step towards that is, that it shall be done in accordance with the wishes of the Volunteers themselves. I should like not only to ascertain, if possible, the opinion of every Commanding Officer, but also of every Officer, and almost every individual man. I may say that I myself, when the Bill was first introduced, suggested to the Secretary of State for War that it should be suspended for the present until he had asked every Commanding Officer of every corps in the kingdom, by circular, exactly what the men would think it right to do, and what they would think beyond the limits of what they should be called upon to do as Volunteers. I believe, if the Bill had been passed upon information obtained in that way in the first instance, there would have been no difficulty at all in its universal application throughout the country. I deprecate in the strongest possible way the idea that Volunteers should in any way be treated like the other defensive forces of the country. They are, in the first instance, civilians before they are soldiers, and the only way of getting the utmost voluntary efficiency out of them is to make your system applied to them as flexible as possible, and to endeavour to enlist the active co-operation of every man by suiting your military circumstances to his particular individual circumstances. Then as regards the future, I trust that that course will be pursued, and that the authorities will at each step proceed by first ascertaining the individual opinion of the men, because it must be recollected that a Volunteer Force is not composed of Officers alone. The *man*, after all, is the individual unit that you want to get at, because if he does not choose to come out he won't come out. I hope further steps will also be taken as to supplying qualified Staff Officers for the mobile brigades. The suggestion made by Colonel Haddan that a smart Adjutant should be attached to the Horse Guards is, I think, not necessary, because we have already the Inspector-General of the Auxiliary Forces, who has at his disposal the very best practical information as to every brigade and Division, and every individual regiment; and I trust one of the steps that will be taken will be to supply each of the brigades with a thoroughly qualified Staff Officer—not necessarily regular Officers—but if in some cases it may be found that the volunteer Brigade-Major would be the best Brigade-Major, at all events the very best qualified Officer should be attached for the onerous duties of the Staff to each brigade, which demand a set of qualities which it is almost impossible to unite in one man. Anyone connected with Volunteers knows how very desirable it is that their rough points should not be touched, and that in developing their military form they should be led rather than driven. I thank you very much for allowing me to make these remarks. I know I am representing the views of other General Officers in the same position as myself commanding volunteer brigades, that they desire to have every possible information from the individuals composing those brigades, and hope that the information that may be gathered in the next few months may lead to making our Volunteer Force more effective than it is at present, and will carry with it the voluntary co-operation of the great body of Volunteers for the great work of national defence.

Colonel HUMMEL: I think we are greatly indebted to Colonel Haddan for giving us the most favourable opportunity for discussion that Volunteer Officers have had for some time. For my own part I was strongly in favour of the retention of the volunteer clause in the Defence Bill of last year. I felt it was a great promotion of the Volunteer Force that it should be so included, and that a great blow was

dealt to it when it was struck out. I do not myself believe that any man who enrolls himself in the Volunteer Service would consider, for one moment, whether such a clause would affect his future prospects. I think he enrolls for the pure love of soldiering. I think also that we are perhaps apt to overlook what the condition of the country would be supposing such a clause ever were put in force. Where would business be in the case of threatened invasion? Would not the whole commercial arrangements of the country be entirely upset? Would not the nation be seized with a military *furor* which would induce men to throng the military centres and enlist wholesale? I think there is not the smallest fear in the world that the Volunteer Force will be affected in any way in strength except favourably by the replacing of such a clause in the Defence Bill. I should, therefore, strongly advocate that some steps be taken by the representatives of the Volunteer Force in the House of Commons for the immediate re-introduction of some such clause. I do not say a compulsory clause, but that power should be reserved to call out such portions of the force as would be able to go out on these occasions. There would in such a case be no invidious distinctions. I might not myself be able to go out, but if any one in my employ, who, I could spare, wished to go, I would readily let him take those duties which he might be called upon to perform in the absence of the regular Army. That I believe is the *raison d'être* of our existence, and therefore we should have every opportunity provided for us to exercise ourselves on these occasions. A very large proportion of the force would be able to go out in the event of an army corps being called abroad, and they would be relieved from time to time; but really I am quite certain that if such powers were reserved it would not affect the Volunteers further than to improve their status in public opinion. Now, with regard to the question of brigade organization, I think it is a very grand step and one which ought to have been taken long ago. It is simply what was wanted. It is an initiatory step, but it is one of enormous importance, and can be carried out with very little trouble and with no expense whatever. Colonel Haddan puts his finger on a great defect in the Volunteer Service, viz., the want of knowledge of the requirements of the Service at Headquarters. I suggest, with all due deference to the Brigadier-Generals, that this might be done through the brigade organization. It was impossible to help, under the circumstances, the very great variation of conditions under which the Volunteer Force was formed. But military bodies require uniformity, and the variations in equipment, in discipline, in command, and in everything connected with the corps are enormous in the Volunteers of to-day, and they counteract, to a great extent, the efforts of the authorities to produce any uniform action. I take it it would be easy for Brigadiers—although it would require some considerable increase in their Staff—to keep in daily touch with every regiment, to ascertain exactly the whole of the details of their interior economy; to know, as well as the Commanding Officer and Adjutant himself, the ins and outs of every regiment, and, as far as possible, to put their discipline and interior economy, and even their financial affairs, on an equal footing. Through them the authorities, the higher authorities at the War Office, would know what regiments are wanting, as to details of equipment, and the various difficulties regiments suffer under for want of drill ground, want of shooting accommodation, what regiments are able to do certain drills in the year, to go to Aldershot, or so on. Every effort should be made to introduce one uniform system. Why should one regiment be able to build handsome quarters while another has to drill in the street? Why should one regiment have a splendid rifle range close at hand when another has to go 20 miles out? All these questions are mere matters of trouble. It is not a matter of expense at all. A mere Act of Parliament would produce the ground for rifle ranges. We have miles and miles of ground on the river marshes, for instance, on which rifle practice could be made; a mere Act of Parliament could enforce the purchase of ground which would produce a range, and the Volunteer Force would be only too glad to repay the Government by a rent. The same thing may be said with regard to drill-grounds. A mere Act of Parliament would be required for the acquiring of property in London to accommodate the various regiments according to their necessities, and they could be repaid out of the Capitation Grant. I am sure I am quite right in saying if anybody would take the trouble—that is all it wants. That having been done, we should get one

step towards a complete army. As to transport and great coats, we do not always want to carry great coats, but we should very much like to know that we could always get them when they are required. We do not always want to be followed about by carts and that sort of thing, but we should very much like to know that they are forthcoming when required. I do not see why regimental Commanding Officers should be required to make inquiries as to whether carts could be obtained if wanted; why should not that be done on a system from Headquarters; why should not they be apportioned to us when we are called out? I think it would be such a very easy matter—it only wants somebody in high authority to move in it.¹ There are many other difficulties which I cannot go into which would be overcome in that way. Let us take the question of the want of Officers. To my mind, to a large extent, it is caused by the Service not being good enough. So much is required and so little given—and really it is getting harder and harder every day. I do think that if steps of this kind were taken, and we were made to feel that we were a real actual force, not doing just as we like, one regiment having beautiful headquarters where they can hold dances every night, and another regiment having no headquarters at all; if it were understood that there was one uniform system, that we all had equal accommodation and advantages, and that if we did not all do well alike we should be dealt with accordingly, the public would then know that we were a good and valuable force, and certainly we should be well officered.² It is a most melancholy thing to see a Secretary of State for War stand up in the House of Commons and say that from various reports he had received, some volunteer regiments were good enough to be put alongside regiments of the line, and others could not be trusted to face a disciplined foreign army. Why should that condition of affairs exist? Who is responsible for it? Is not the Secretary of State for War himself responsible? I do not know anyone else who is. I think by the exercise of common-sense all these difficulties might be got over, and the Volunteer Force would thereby be greatly benefited.

MR. J. R. MACDONNELL: Might I say one word with regard to an observation that fell from Colonel Hummel? He said the dropped clauses would not be objectionable because the country would be in a peculiar state of ferment at the time that would come into operation. The position of those who, like myself, opposed these clauses was, that by the conditions they might *legally* be put in force when the country was *not* in such a condition of ferment.

Colonel BLUNDELL, M.P.: There is a point that has come under my notice, having the honour to command one of the volunteer brigades, and that is the difficulty of getting anyone in the country to take the initiative in getting up a fund to obtain the equipment to complete the different regiments. The Lord Mayor of London has shown his appreciation of the necessity of the Volunteer Force being equipped. He has passed Temple Bar in taking in the metropolitan Volunteers; and if a case ever arose in which the metropolitan Volunteers were used, the volunteers of the country would also be required. I would therefore strongly urge the Lord Mayor to make the fund he is raising a national fund. As far as I could judge, I think it would cost probably something between half a million and a million to complete the equipment of the Volunteer Force—that is, less than the cost of one ironclad; and if our force was properly equipped—even if we were to look upon it from the naval aspect that has been so much spoken of—it would free our Fleet to an extent that would be far more than the value of a single ironclad. I am anxious to urge that strongly, because I find in the country while people are

¹ It appeared from the observations of the gallant Chairman that I did not make myself clear on the subject of transport. I hold that it should be organized by the War Office on a wide and comprehensive basis, the whole carrying capacity of the country being registered and apportioned to districts and regiments.

² The report omits some remarks by which I meant to convey the opinion that from the peculiar conditions, chiefly traditional, but largely existent, of the Volunteer Force, the position of an Officer is not endued with such a degree of distinction, in comparison with the other Services, as to counterbalance the great and increasing work it demands.

friendly disposed towards the equipment you cannot get anybody to take the initiative. There is another point I am anxious to say a word upon, and that is this question of the clauses in the Defence Bill of last year. I think they want to be more thoroughly understood by the Volunteer Force. My impression is the Secretary of State for War was anxious to take a power, but that the Volunteer Force might have trusted him not to have exercised that power in an improper way. Because, you must recollect, you can only call the volunteers out in case of actual or apprehended invasion. Well, it might be very objectionable to a Government to have to say they apprehended invasion: if they did, the Government would not like to have to say so: therefore it wants something more. Now, what was suggested to me—and what appears to me to be right—is that a Government ought to have the right to embody the Volunteer Force if they are prepared to announce on their responsibility, as a Government, that they will bring in a Bill to suspend the “Ballot for the Militia Suspension Act.” This would show the country that there really was a crisis which required the Volunteers to be embodied. If that Act were suspended every rich man, or in fact everybody, would feel that he was liable to serve in the militia, and that therefore it was necessary for him to do his utmost that the Volunteer Force which came forward should feel secure that there should be separation allowances for families, and that funds would be got up. I think if the Government, upon its responsibility as a Government, was prepared to declare that the Ballot Suspension Act for the militia ought to be suspended or repealed, that then you would find you could use your Volunteer Force, that then you would find the Volunteer Force would come out, and no one would suffer; and if the Volunteer Force were properly supported by localities—localities who so supported the Volunteer Force might thereby prevent the necessity of the militia ballot being enforced.

Major BARRINGTON FOOTE, R.A.: I had not the slightest intention of speaking this afternoon. I have myself had nothing whatever to do with the Volunteers except that for some few years I used to go down on the Staff to Wimbledon, and I remember those times with very great pleasure. I wish, however, to show good comradeship on the part of the arm to which I belong. I am sure none of us in the regular Army wish the Volunteers to think that in any great question of this sort they are left entirely to themselves; and I am further sure I am only expressing the feeling of my brother Officers of the regular Army in saying that that is not the case. We take the keenest interest in matters concerning the Volunteers and all that has to do with their progress, organization, and efficiency. One point brought forward by two or three speakers is that there should be plenty of rifle ranges and plenty of butts spread all over the country, so that it would be easy for Volunteers to go out and practise rifle shooting before or after their regular day's work. That is no doubt greatly to be wished, but it is very difficult to attain. The firearms of the present day have increased this difficulty. I belong to the Royal Artillery, and it may surprise many to hear the range required for the guns of my own battery (12-pr. B.L.) is such that we have only one land-range in the whole of England where we can practise, and that is on Dartmoor, at Okehampton. We used to have other practice grounds, but they are useless for this new gun. By that I do not mean to say the actual range we are firing at could not be obtained, but that is not the only question. It is the ricochet shot, where the shots may go on to. So then you have to consider for long-range rifles, with very flat trajectory, not only the butts but the whole country. That is one difficulty in obtaining numerous rifle ranges. It is true you do not want the ranges as extensive as we do for cannon, but still modern rifles and modern musketry do make it much more difficult to get ranges which give sufficient country beyond, unless you have precipitous hills or cliffs at the back.¹ The sum total—the essence of what most of the speakers have been advocating—is simply money, more money. Nobody has said that in so many words, but that is what it comes to. I am sure everybody wants the Volunteer Force to be as efficient as possible, but that efficiency must touch

¹ I am alluding, of course, to practical work, such as *firing* other than independently and at unknown ranges not only where individual—and individual firing alone—is practised.

finance. Whether it is a question of equipment, or of rifle ranges to be bought, or butts to be built, of transport, or of providing for the families of those who may possibly at some time be crippled on active service—every one of these points means outlay. Most of them mean outlay *now*. Equipment, butts, ranges, transport—that means money at once to be voted, and we know that this must come before the House of Commons, and we also know very well that a great increase of the Budget, unfortunately, either for the Army or Navy, is not received with entirely unanimous approval in that assembly. My opinion is that any Government—I do not care which party is in power—would be unwilling to ask for a large extra expenditure, absolutely necessary as it is, unless they felt that the public were on their side, and that such an expenditure would be popular with the people generally. Of course it would be popular with us. After all, it seems to me that it is partly in the hands of the Volunteers themselves to *convert* the public. A little leaven will leaven a whole lump. You have a very large leaven in the volunteer body, and if the whole of the Volunteers will set to work to convert the British public to the absolute necessity of this extra expenditure, it might then be brought forward with confidence. I am not advocating public speaking, but quiet talking together over the fireside. If the whole of the Volunteers in the British Isles were really honestly to set to work, each in his own circle, I venture to believe the whole of the taxpayers of England might be won over. The Government would be perfectly well aware of this conversion of the public mind, and then, and then only, would it be willing to ask for such a large extra outlay as would be necessary.

Colonel HADDAN: There was one mistake I made in Clause 4. I said, "A recent case at Liverpool affords an example of the troubles that may ensue from such societies attempting to deal with ordinary matters of a military nature." I was informed officially—I may say semi-officially—that a certain society had been censured for some of its junior Officers mixing themselves up with the formation of a marching column at Easter. I have since been informed that the General commanding that district received an explanation from the Volunteer Officer of the district, and he stated that he was perfectly satisfied with the explanation that that Officer afforded. It is only an act of justice to say that I made the statement in perfect good faith. I was not aware at the time that the censure had been withdrawn—even if it were given.

The CHAIRMAN: My remarks will be very brief. I may say, offhand, I think almost every soldier agrees in substance with what the lecturer has stated—that the country has hitherto asked far too much of the Volunteers, and done far too little. I think everyone agrees to that. But, gentlemen, it is in your own hands. Every now and then you have an election; you send people to the House of Commons. If you would concern yourselves a little less whether he is a Tory or what is called a Liberal, and concern yourselves a little more about the defence of the country and the Volunteers, it would be better. I enjoyed immensely the eloquent speech of Major Todd. He has depicted rather a sorry aspect of things: my only consolation is that he and men like him have done so much to retrieve the negligence of the lazy ones. With regard to his experiences when he was young, with regard to the Germans, it is no doubt true that the Englishman, well paid at home when the country is in a flourishing state, does not care to go abroad anywhere. There are, besides, only a limited number of us; and those Germans, who irritated him when he was a little boy, were hired for the Crimea; and I believe we only brought them home here to England when, as usual, having started too late, the Crimean War was over before they arrived. I was interested in telling you that because we did not enlist the Germans to defend England. His suggestion that we should enlist the ladies on our side was carried out to our great detriment in 1881, for there is a country with which I had something to do, in South Africa where they appeared to have carried out his suggestion literally. There were three girls married on the morning on which we signed the Peace. I saw those three girls, and they had been waiting from before the outbreak for their marriage; but they said, "We do not want to marry till the war is over." So that that suggestion has been carried out by a race which we, unfortunately, once too much contemned. I think Colonel Hummel made a mistake in talking about the transport. He said we should find

it. Well, I have found that you men of business do your business much better than we do. We are finding the transport, because we give you the money. In the district from which I have recently come, every Officer who has been offered a sum of money has told me verbally, and officially on paper, that with the allowance the Government has given him, he could find the transport. There has been a complaint about great coats. Many corps have great coats, but if you are approaching the Secretary of State for War and asking him for money, you must expect he will be a little inquisitive as to what you do with your Capitation Grant, as to whether it is given away in prize meetings or as to whether it ends in inducing the men to go into camp. You have to consider that. I think you do not get nearly enough. I have said so publicly and privately. I have kept the cream of the thing for the end. I consider the City has behaved rather worse than all the rest of England—with regard to the Volunteers. I scarcely know anyone in the City who has come forward in the way in which the country gentlemen have done, and the City has seemed to have not the slightest interest in you. Well, I am happy to say, with the present Lord Mayor, we have fairly turned the corner, and we shall all be now too grateful to the City for what they are doing. I will, with your permission, read this paper: "The Lord Mayor would have been present to-day but is detained at a special meeting of the Corporation. He proposes to raise a fund of 100,000*l.* for the metropolitan corps." He states "that this movement is already spreading, and several Mayors of large provincial towns are following his lead." It only remains for me, in your name, to thank the lecturer for the interesting paper that he has read to us.

Friday, March 29, 1889.

SIR THOMAS CRAWFORD, M.D., K.C.B., Q.H.S., Director-General,
Medical Department of the Army, in the Chair.

THE SOLDIER'S FOOD, WITH REFERENCE TO HEALTH AND EFFICIENCY FOR SERVICE.

By J. LANE NOTTER, B.A., M.D., Surgeon-Major Medical Staff; Professor of Military Hygiene at the Army Medical School, Netley.

I HAVE the honour to speak to you this afternoon on the soldier's food, a subject which has recently received more than ordinary attention from members of the military Service as well as from the public press. And the reason for so much attention having of late being drawn to this subject is not far to seek, if, as I believe, the importance of the food ration of our soldiers has been heightened by the action of the short-service system of enlistment. This system has contributed largely to the youth of the Army.

If we take the effective strength and comparative statement of ages of non-commissioned officers and men of the British Army serving in India from 1876 to 1885 inclusive, the results show an annual average of 769 lads under 19 years of age, and 960 boys between 19 and 20 years of age.

Or, again, we find in the "Army Medical Reports for 1886," that the average age of 73,456 recruits inspected in that year was 19·5 years.

The recruit at 19 years of age has not only to work, but also to grow and develop. "At this most critical period of life," as Sir Wm. Aitken remarks, "recruits can be brought under judicious training, when they ought also to have precisely the amount of exercise and the amount and kind of diet best fitted for them." In the absence of this, there is a thorough breakdown—so important a factor is food in the ultimate development and staying power of the soldier.

It is a universal rule in Nature that where work has to be performed, either by man or animal, the food must be in proportion to the labour. "Food is the source from which muscular force is derived, and hence the supply of food should be in proportion to the amount of work that is to be performed."

Now, work is most conveniently estimated as so many pounds or tons lifted 1 foot high, and for much of our information on this point we are indebted to the Reverend Professor Haughton's experi-

ments. This gentleman has shown that walking on a fairly level road at the rate of about 3 miles an hour is nearly equivalent to raising one-twentieth part of the weight of the body through the distance walked. An easy calculation changes this into weight raised 1 foot, and in this country muscular work is expressed as so many tons lifted 1 foot high. His formula is as follows:—

$$\frac{(W + W') \times D}{20 \times 2,240},$$

where W is the weight of the person; W' the weight carried; D the distance walked in feet; 20 the coefficient of traction; and 2,240 the number of pounds in a ton. The result is the number of tons raised 1 foot. (To get the distance in feet multiply 5,280 by the number of miles walked.)

The following table, taken from Parkes' Hygiene, will show the amount of work a soldier performs under special circumstances, assuming him to weigh 160 lbs. with his clothes:—

Kind of exercise.			Work done in tons lifted one foot.
Walking	1 mile	.....	18·86
"	2 "	.....	37·72
"	10 "	.....	188·60
"	20 "	.....	377·20
"	1 "	and carrying 60 lbs..	25·93
"	2 "	" " ..	51·86
"	10 "	" " ..	259·30
"	20 "	" " ..	518·60

An average day's work may be roughly stated as equal to 300 tons lifted 1 foot. 400 tons is a hard day's work, and 500 tons an extremely hard day's work which few could keep up continuously.

It is true the soldier has not a 10-mile walk every day, but he has his ordinary drill and gymnastic exercises, along with fatigue duties. His drills are a series of movements that are constrained, and his dress, unfortunately, does not admit of that free play of his muscles which is so essential to their most efficient action. Besides, he is not at liberty to regulate his pace according to his pleasure or condition at the time, and all this is really equivalent to extra labour in its fullest sense.

I have already said that the source from which the force, or in other words the power for muscular movements is derived, is food, and the way in which food acts is concisely stated by Fick as follows:—

"A bundle of muscular fibres may be looked upon as a machine consisting of albuminous material, just as a steam-engine is made of steel, iron, brass, &c. Now, as in the steam-engine coal is burnt in order to produce force, so in the muscular machine fats or the hydrates of carbon are burnt for the same purpose. And in the same manner as the constructive material of the steam-engine (iron,

&c.) is worn away and oxidized, so the constructive material of the muscle is worn away." Such is Fick's explanation. Moreover, experiment has now fully established the theory that heat and energy are manifestations of the same force, that the property to convert latent heat into mechanical motion is inherent in the muscles themselves, and that the manifestation of this property is determined through the nervous system. Nervous impulse is converted into muscle impulse, and as a result, mechanical action follows, for the close of the latent period of muscle impulse is succeeded by a wave of contraction.

All the motions of our hands are performed by the contraction of our muscles; they all depend on the property of our muscles to contract if they are excited by our nerves.

Now let me repeat: every manifestation of energy, whether movement, heat, or nervous action, has its origin in food.

I have next to say a few words on food in its chemical relation. Professor Baron von Liebig divided foods into three great classes, and although we no longer accept his interpretation of the way in which the various foods are subsequently split up and utilized in the body, we retain his classification on account of its simplicity, convenience, and practical accuracy.

His classification is—

1. Organic nitrogenous substances.. Albumen, fibrine, gluten, &c.
2. Organic non-nitrogenous } fats } stearine, butter, &c.
 substances .. } starches } wheat flour, &c.
3. Inorganic salts.

1. *The Nitrogenous Substances.*

These, as their name implies, consist of a group in which nitrogen is largely present. They are represented by albumen or white of egg, by the albuminous principles of meat, milk, and blood, and also by the vegetable albumen or gluten of flour, peas, lentils, &c.

Now what is the use of this class in foods? In the first place they readily afford the requisite materials for the construction, maintenance, and repair of those parts whose chemical elements are similar to their own, and especially of the muscles.

It is to these nitrogenous substances that we must look for the repair of the waste of tissue which occurs in the act of muscular contraction, that is, in muscular work of every kind. It is to food from this class that we expect to derive firm muscles, in good condition for active work; and as it is such that we want in the soldier, the supply of such food should be in proportion to the amount of work that is expected from him. It is by means of such food, combined with suitable exercise in the open air, that the bright red appearance of healthy muscle is obtained, but we must always remember that our muscles are fatigued when we use them, we cannot do more than a certain quantity of work during a certain time. Our muscles want repose and time as well as food for restoring their energy and their power.

Secondly, the nitrogenous substances assist in the production and maintenance of heat. Professor Frankland accurately measured the heat produced by burning in oxygen one gramme of albumen, beef muscle, &c., and from the result calculated the number of heat-units obtainable; a heat-unit being equal to one gramme of water raised one degree centigrade. His experiments gave the following results :—

*Actual Energy developed by each Substance when Consumed
in the Body.*

Name of substance, dried.	Heat-units.	Foot-tons of force.
Beef muscle, purified	4,368	5·96
Albumen, purified.....	4,263	5·82

It is then to the chemical oxidation of nitrogenous matter that the nutrition and re-formation of their tissues, as well as the production of muscular heat, is due; but please remember that such substances are inadequate to support human life by themselves, and that an animal fed exclusively on such a food would die of starvation.

2. *The Non-Nitrogenous Substances.*

These include *two* classes : first, the *oils and fats*, composed altogether of carbon and hydrogen, with a small proportion of oxygen; and, secondly, the *starches*, such as are contained largely in flour, potato, &c. The former are known as hydro-carbons, the latter as carbo-hydrates. As the heading implies, they have no nitrogen entering into their composition.

The hydrocarbons or fats are represented by butter, suet, dripping, &c., and are contained in more or less quantity in all animal and vegetable food.

Now to what purpose in the animal economy is this class subservient? The first great purpose is the maintenance of heat, and the second is the production of mechanical force. Fats are capable of undergoing direct oxidation, and it is their union with oxygen or their combustion in the muscles which generates the force, which is rendered apparent in locomotion or manual labour; muscular work *can* be done, and frequently is done, on food containing no nitrogen, as on a diet of biscuits of starch and sugar, or starch and fat, but there is a limit to the muscular force which can be exerted under such circumstances.

This class of food can only be digested when used in conjunction with nitrogenous food, for it has been proved by experiment that if animals are fed on fats alone, they soon cease to digest their food, the appetite fails, and they die of starvation. Fat, however, has over

twice the potential energy of the carbohydrates, but it cannot be used alone in their stead, at least, not in temperate and tropical climates, although in very cold regions it is capable of being used in this way. I have seen this in Northern Canada, where enormous quantities of fat were disposed of. And here it may not be out of place to mention that there is a strong presumption in favour of the opinion that "the absence or deficiency of oleaginous matter in a state fit for appropriation by the nutritive processes is a fertile source of diseased action, especially that of a tuberculous or consumptive character."

Of the invalids passing through the Royal Victoria Hospital, Netley, *under* three years' service, the majority are discharged, *first*, from pulmonary consumption; *secondly*, from heart disease, and I believe there is reason to suspect that these diseases are at least favoured by an injudiciously arranged diet, as I shall show hereafter.

I mentioned as a subdivision of this second great class the carbohydrates or starches, which are derived solely from the vegetable kingdom, such as wheat flour, arrowroot, potato, &c. In their natural state, *i.e.*, as starch, they are never absorbed into the blood; they require as a preliminary condition to undergo the process of digestion, whereby they are changed into sugar and they are closely allied to the hydrocarbons or fats. These two substances are subservient to the same purposes in the animal economy, but must be each used in proper proportion. We cannot, as yet, assign to each its independent or relative value, but we know by direct experiment that, though so closely allied, they are not interchangeable, and that one cannot always replace the other. Such, then, are the general uses of the non-nitrogenous elements, they produce fat, and by oxidation, heat and mechanical energy.

3. *The Inorganic Salts.*

Under this head are included chiefly sodic chloride, or common salt, potassic chloride, calcic carbonate, &c., and sulphur, all entering with a certain percentage of water into the composition of some of the more complex principles of food already considered. With the exception of water and common salt these substances are contained in sufficient proportion in the preceding groups, and do not require to be separately supplemented.

Salts probably assist in the oxidation of matter, whether effete or otherwise, when increased energy is demanded, and the solvent power of salt over albuminous compounds is perhaps another reason why it is so largely used, but I must acknowledge that the precise mode in which salts act has not yet been ascertained.

Before leaving this part of my subject, I must not omit to refer to the necessity of fresh vegetables as an article of diet.

These vegetables belong chemically to the carbo-hydrates, but act differently. They contain oxygen in excess of that required to form water; the invariable consequence of the omission of them is soon

followed by the development of the condition known as "scurvy," while they are among our best remedies for the cure of these affections.

Having thus briefly considered the general principles of diet, I shall now pass on to the consideration of the soldier's diet in detail, which forms the chief object of this paper. You will remember that when speaking of the soldier's work I considered it as equivalent to 300 foot-tons daily; now we ought to estimate his food in connection with the amount of work he is called upon to perform, and I shall, therefore, give a few standard diets to enable us to compare the soldier's diet with the quantity of food required. The food necessary in actual repose is, according to Playfair, as follows:—

	Ounces.	
Albuminates.....	2·0	} Nitrogen, 138 grains. Carbon, 2,969 grains. Salts, 219 grains.
Fats	0·5	
Carbo-hydrates	12·0	
Salts	0·5	
<hr/>		
Total water-free food	15·0	

Calculating the potential energy in foot-tons, we have—

Albuminates	337 foot-tons.
Fats	140 „
Carbo-hydrates	1,816 „
<hr/>	
Total.....	2,293

It is doubtful if this is even a subsistence diet. Dr. Parkes considered a man would lose weight on it.

Moleschott has given a standard diet for a man in ordinary work. It is as follows, and is based on the amount required for 300 foot-tons of productive work:—

	Ounces.	
Albuminates	4·59	} Nitrogen, 315 grains. Carbon, 4,734 grains. Salts, 463 grains.
Fats.....	2·96	
Carbo-hydrates	14·26	
Salts.....	1·06	
<hr/>		
Total water-free food..	22·87	

For any laborious work, and for active service in the field, this diet should be increased to the following quantities:—

	Ounces.	
Albuminates.....	6·5	} Nitrogen, 455 grains. Carbon, 5,990 grains. Salts, 568 grains.
Fats	4·0	
Carbo-hydrates	17·0	
Salts	1·3	
<hr/>		
Total water-free food..	28·8	

Proximate aliment.	Absolute rest.	Ordinary work = 300 foot-tons.	Hard work, or active service in the field.
Albuminoids.....	Ounces. 2·0 } Nitrogen, 138 grains. 0·5 } Carbon, 2,969 grains. 12·0 } Salts, 219 grains. 0·5 }	Ounces. 4·59 } Nitrogen, 315 grains. 2·96 } Carbon, 4,734 grains. 14·26 } Salts, 463 grains. 1·06 }	Ounces. 6·5 } Nitrogen, 455 grains. 4·0 } Carbon, 5,990 grains. 17·0 } Salts, 568 grains. 1·3 }
Fats.....			
Carbo-hydrates			
Salts			
Total water-free food	15·0	22·87	28·8

12 N

These would yield of potential energy—

Albuminates.....	337 foot-tons. 140 " " 1,816 " "	784 foot-tons. 1,118 " " 1,967 " "	1,124 foot-tons. 1,512 " " 2,346 " "
Fats.....			
Carbo-hydrates.....			
Total foot-tons.....	2,293	3,869	4,982

These may be accepted as standard diets. For peace-time at home, and for growing men, that for 300 foot-tons of active work may be taken. The diet contains the amount of aliment necessary for a man weighing about 10 stone. It gives him 22·87 ounces of water-free food. Perhaps it may be desirable that I should here explain what is meant by water-free food. Every alimentary substance, flesh, fish, bread, vegetables, and the like, contains a certain amount of water.

In meat the water is	75 per cent.
In potatoes the water is	74 "
In bread the water is	40 "
In cabbage the water is	91 "

In mixed food the water may be taken at 50 per cent., so that a man getting 22·87 water-free food would really receive 45·74 ounces of ordinary food.

In addition to this, a man requires 50 ounces or so of water, in some shape or form; this is the usual range, but the exact quantity varies with the size and activity of the individual.

I have placed in this table the percentage composition of some of the ordinary articles of food one is likely to meet with in the Service.

Percentage Composition of Foods.

Articles.	Water.	Albuminates.	Fats.	Carbo-hydrates.	Salts.
Meat	75·0	15·0	8·4	..	1·6
Pork	39·0	9·8	48·9	..	2·3
Bacon	15·0	8·8	73·3	..	2·9
Fish	78·0	18·1	2·9	..	1·0
Bread	40·0	8·0	1·5	49·2	1·3
Potatoes	74·0	2·0	0·16	21·0	1·0
Flour	15·0	11·0	2·0	70·3	1·7
Rice	10·0	5·0	0·8	83·2	0·5
Milk	86·8	4·0	3·7	4·8	0·7
Butter	6·0	3·3	88·0	..	2·7
Oatmeal	15·0	12·6	5·6	63·0	3·0

And now to summarize what I have just said. A soldier's ration should consist, at least, of nitrogen 315 grains, of carbon 4,700 to 5,000 grains daily, and in the following proportions:—albuminoids, 4½ ounces; fats, 3 ounces; carbo-hydrates, 15 ounces; and salts, 1 ounce. This would yield productive work equal to 300 foot-tons, after providing for the internal heat and the work of the body itself, which latter may be taken together as equal to 260 foot-tons.

I should deem it unnecessary to mention in this place the sources from which the soldier draws his food, if it were not that to do so will help my explanation of the nutrient value of his diet.

In the first place, he draws from the Government $\frac{3}{4}$ lb. of meat and 1 lb. of bread.

Secondly. By payment of $3\frac{1}{2}d.$ per diem he gets his grocery ration, usually excellent, and fully worth the money.

Thirdly. These are his individual purchases, and it is hard to determine this uncertain quantity.

The grocery ration is not the same in all regiments, and latterly a complete change has taken place in many.

Taking that which is usually supplied, we may, I think, accept the following as a fair sample of the soldier's ration, including the Government ration and his grocery ration, but excluding his private purchases:--

Articles.	Quantity taken daily in ounces and tenths of ounces.	Water.	Nitrogenous substances.	Fat.	Carbo- hydrates.	Salts.	Water- free food.
Meat	12 ozs., of which one- fifth is bone.	7.20	1.44	0.81	..	0.15	2.40
Bread	24	9.60	1.92	0.36	11.81	0.31	14.40
Potatoes	16	11.84	0.32	0.02	3.36	0.02	3.72
Vegetables	8	7.28	0.14	0.04	0.46	0.06	0.70
Milk	3.25	2.82	0.13	0.12	0.16	0.02	0.43
Sugar.....	1.33	0.04	..	..	1.29	..	1.29
Salts	0.25	..	..	..	..	0.25	0.25
Coffee	0.33	..	..	..	..	..	..
Tea.....	0.16	..	..	..	..	..	..
Total quantity.....	65.32	38.78	3.95	1.35	17.08	0.81	23.19

Nitrogen = 276 grains.
 Carbon = 4,588 grains.
 Salts = 354 grains.

This gives a total of 23·19 ounces of water-free food. The potential energy of this diet is—

Albuminates.....	673 foot-tons.
Fats.....	510 ,,
Carbo-hydrates	2,357 ,,
	<hr/>
Total.....	3,540

Comparing this with the standard diet, we find a deficiency of 11·5 per cent. in the albuminates, of 54 per cent. in the fats, and more than 23 per cent. in the salts, whilst the carbo-hydrates are 19 per cent. in excess.

This is very short of the standard diet, and is most important when we look to its source. As a result of this deficiency in the albuminates and in the fats, increased work is required from the carbo-hydrates, and this the system does not readily adapt itself to. In the standard diet, 20 per cent. of the potential energy is due to the albuminates, 29 per cent. to the fats, and 51 per cent. to the carbo-hydrates. Whereas in the soldier's ration, 19 per cent. is due to the albuminates, only 14 per cent. to the fats, and as much as 68 per cent. to the carbo-hydrates.

Now let us compare this with the diet issued to Continental armies.

In Continental armies we find that, with the exception of the Austrian Army, all have over 26 ounces of bread, and six have 30 ounces or more. The meat ration of the Continental armies is on an average only $7\frac{1}{2}$ ounces, the Swiss Army being the highest with 11 ounces.

Soldiers' Rations of European Armies in Ounces Avoidupois.

	French.	German.		Austrian.	Belgian.	Dutch.	Swiss.	Italian.	Danish.	Swedish.	Russian.	Turkish.
		Smaller ration.	Larger ration.									
Fresh meat.....	10·58	3·8	8·81	9·87	8·81	8·81	11·00	6·34	8·74	5·67	7·054	9·06
Salt meat.....	..	..	..	or 5·99	..	..	..	..	..	4·09	..	..
Preserved meat ..	..	..	..	..	..	..	..	..	..	..	..	..
Dutch cheese, } sardines in oil }	..	..	..	..	..	..	..	..	..	..	..	..
Fish .....	..	..	..	..	..	..	..	..	..	4·01	..	..
Bread.....	35·27	26·45	26·45	5·29	27·16	26·45	26·45	32·38	26·45	29·98	..	34·08
Biscuit.....	..	..	..	or 3·527	..	..	..	..	..	0·24	34·9	..
Flour .....	..	..	..	25·18	..	2 litres	..	..	..	..	..	..
Potatoes .....	..	..	70·54	7·76	35·27	$\frac{1}{4}$ d.	1 d.	1 d.	..	..	..	0·74
Other fresh vegetables.	3·527	..	..	..	..	..	..	..	..	..	..	..
Dry vegetables ...	1·058	..	or 10·58	..	..	..	..	5·29	..	..	..	0·77
Rice .....	..	..	or 4·23	..	..	1·763	..	..	..	5·6	..	3·35
Barley .....	..	..	or 5·29	..	..	..	..	..	..	..	..	..
Oatmeal .....	..	..	..	4·93	..	..	..	..	..	..	..	..
			Sour Kroot	5·29								
Suet.....	..	..	..	1·05	0·70	0·881	..	..	..	1·13	..	0·33
Butter.....	..	..	..	..	..	..	..	..	..	..	..	..
Oil.....	..	..	..	..	0·35	..	..	..	..	..	..	..
Bacon .....	..	..	..	..	..	1·40 in place of half meat ration in winter.	..	..	..	..	..	..
Coffee .....	..	..	..	..	..	..	..	0·529	..	..	..	..
Sugar.....	..	..	..	..	..	..	..	0·7	..	..	..	..
Salt .....	..	..	..	..	..	0·7	..	..	0·42	..	..	0·74

In all these armies there is a deficiency in fats, while the carbohydrates are in excess. This is particularly the case in the German, Austrian, and Russian armies, where there is a marked deficiency of nitrogen and a too great preponderance of starchy matters, a diet which is unequal to the support of men in health during active service.

The large amount of vegetables used in Continental armies is worthy of remark, and the taste for this class of food is doubtless increased by the foreign methods of cooking, which are so far superior in many ways to ours.

Lately, Colonel Burnett, commanding the 1st Battalion Royal Irish Rifles, has, in a memorandum addressed to the Quartermaster-General, made some most valuable suggestions, with a view of improving the diet and comfort of the soldier. I am indebted to his kindness for copies of his books, and for very many valuable hints. Colonel Burnett was the first Officer, I believe, who considered that the nutriment of bone, which really forms one-fifth of the soldier's meat ration, should be made use of.

Now, the nutritive value of bones may be reckoned at one-third that of beef in carbon, and at one-sixth in nitrogen.

Colonel Burnett has had the wisdom to ignore the prejudice which exists among certain classes of the English people against any food that is not solid--always excepting beer and wine, which they suppose to be particularly strengthening as well as stimulating. Hence liquid foods are despised and rejected.

Such people constantly say that they have had no food, when in reality they have partaken freely of milk, beef tea, or beer; and yet it was not always so. It is not so long ago that the agricultural labourer, at least in the South of England, used to have broth for breakfast, broth again for dinner, followed by more substantial food, and broth with bread again for supper.

But since the great increase in wages and the cheapening of food in this country, broth has gone out of fashion, and the British workman has got to consider himself well fed only when he can procure for himself a pound of beefsteak, with a modicum of white bread, and beer *ad lib.* The soldier now has much the same ideas, but he should be taught better, and Colonel Burnett deserves the best thanks of the Army for his endeavours in this direction.

In his memorandum, Colonel Burnett mentions that his stock for soup is made from bullocks' heads, and I have carefully calculated the nutritive value of this part of the ox. I find that an average bullock's head weighs 19 lbs. 9 ozs.; that the amount of meat on it, fit for soup, is 9 lbs. 4½ ozs., and the bones fit for soup, 9 lbs. 2 ozs. The bone and gristle from the nose and the parings, which I thought would not be used, weigh 1 lb. 2½ ozs. In a bullock's head we have then 18 lbs. 6 ozs., one-half of which is meat, available for making soup.

There is an expression used I should like to explain. Some speak of "bone soup" as if it contained no nourishment. Now, such is not the case. Bones make most palatable soup, and yield much nutriment.

The following is the composition of bones, in the ordinary beef ration, analyzed at Netley.

Analysis of Bone.

		Constituents of Albuminates.	
Water	12.1	Digestible albuminates ..	10.3
Albuminates	24.5	Peptones	1.9
Fat	11.0	Extractives	1.0
Ash	48.6		
Loss	3.8	Total useful.....	13.2
	100.00	Indigestible albuminates..	11.3
		Total	24.5

I have very carefully calculated out the value of the dietary which Colonel Burnett has arranged, and find it as follows:—

Colonel Burnett's Scale.

	Albu- minoids.	Fats.	Carbo- hydrates.	Nitrogen.	Carbon.
	Ounces.	Ounces.	Ounces.	Grains.	Grains.
Breakfast	0.9922	1.2400	5.2663	69.454	1637.6
Dinner {	Soup	0.9126	0.2992	1.2227	63.882
	Meal, &c.	2.1657	0.9073	6.0503	151.599
	Pudding and pie ..	0.1765	0.3238	1.1282	12.355
Supper.....	1.0401	0.4676	5.2867	72.807	1395.3
Total.....	5.2871	3.2379	18.9542	370.097	5867.0

In this scale, we have—

Albuminates.....	5 $\frac{1}{4}$ ounces.
Fats	3 $\frac{1}{4}$ „
Carbo-hydrates	19.0 „
Nitrogen	370 grains.
Carbon.....	5,867 „

The potential energy from this diet is equal to 4,742 foot-tons.

I gave Colonel Burnett the results of a previous analysis of his system, pointing out that it had only one fault—deficiency in fats, and suggesting that he should endeavour to remedy this by adding one ounce of fat in the form of butter, suet, dripping, or the like, to each ration, and he at once adopted that suggestion, and the above is his amended scale.

This result is achieved without one penny extra expense to the State or to the private soldier. This diet is ample, it provides for 400 foot-tons of productive work. Now, this, in more concrete terms, means

that a soldier, whose weight with his clothes is 160 lbs., can carry 60 lbs. of ammunition and walk a distance of $15\frac{1}{4}$ miles on this food, which is ample to provide the mechanical energy for such a march. I have no better solution to offer than Colonel Burnett has given. He has shown how the soldier may be fed both economically and well. It has been argued that prices are low at Mullingar—of this I know nothing. I take it to be the duty of the medical Officers to say whether food is sufficient in quantity and good in quality, or whether it is not. And if it is both these, and properly cooked, they have no further advice to offer.

I beg to quote here one or two extracts from Colonel Burnett's letter to me.

"A singular thing," he says, "about the new system is, that it has been found to increase the soldier's meat ration at dinner. Since I first started making soup from the bones, I have had them weighed, and at first found that the proportion of bone averaged between $\frac{1}{5}$ and $\frac{1}{6}$ per man, but now the proportion of bone is found to be $\frac{1}{7}$, $\frac{1}{8}$, and even $\frac{1}{9}$.

"The explanation of this is that when bullocks' or sheep's heads are not procurable (which is frequently the case) the companies purchase shins from the meat store to make their supper stews with, and in this way dispose of a considerable portion of bone which would otherwise have to be issued with the men's rations. It will be apparent in this way that the men's actual meat ration has been virtually increased, and a test will clearly prove the truth of this. The prices in the grocery book will probably appear low, and may give the impression that the articles are not of good quality; but I would assure you that they are excellent, and the prices have been arrived at by my insisting on the contractor supplying the canteen on the lowest possible prices at which I found they could be got. From the canteen I have them issued at cost price, on the principle that as they form part of the soldier's daily ration, no one has any right to make a profit on them."

"Another objection to my system which has cropped up, and which I think it right to refute, is that in large garrison towns there are so many attractions outside barracks, the men would not stop in for their suppers.

"The same might be said of the present tea meal, and yet it is provided. To make my plan work, I allow the men to fix their own supper hour, which they do, and in this way I find that almost to a man they wait for their suppers (which are attractive enough to induce them to wait), and go out afterwards."

"Anyway, if a good supper is provided, even if the men do not wait for it, it cannot be said that the State has not done its duty towards them. A great thing is to get the men to eat their suppers, and I am convinced this can be brought about by allowing them to have a voice in the matter of arrangements, &c."

The ordinary diet of the soldier is, unless the greatest supervision be taken, quite insufficient, and it should be our aim to provide him with food that shall furnish him with enough force for the work

required of him, and also of sufficient variety to prevent the occurrence of scurvy. It must be remembered that two points are now well established without doubt:—1. That man can live on vegetable food only, provided it contains nitrogenous matter, fat, and starch in due proportions. 2. That man cannot live and keep well on cooked meats alone, he requires the addition of starch. If a man is in good health the balance between the amount of nitrogen ingested and egested is fairly evenly kept, but if the amount of nitrogen be diminished below the proper standard, debility follows, with emaciation, the result of rapid destruction of tissue. If under such circumstances exercise be continued, then, as muscles while in action appropriate nitrogen, this nitrogen must be supplied by food, or be taken from some other part of the body. In other words, in the absence of a proper supply of food, the active muscles feed on those less actively employed. Perhaps this is one of the reasons why so many young soldiers break down in our Army from that irritable condition of the heart known as “the soldier’s heart.”

Sir William Aitken tells us that “recent observations have shown that the greatest amount of growth of the heart takes place at from 18 to 25 years of age, so that up to the 25th year of life the heart has not matured in growth.”

The heart is in constant action, and requires a large supply of nitrogen for repairing the waste that continually occurs, and this is lessened by the voluntary muscles being exercised, when sufficient provision is not made for the supply by food. Another point, or error, I should say, rectified by Colonel Burnett’s scale is the sameness in the dietary of soldiers. This monotony, which has been more or less a constant factor, causes the appetite to lessen, whence the health soon suffers.

A monotonous diet probably contributes, although in a minor degree, to produce the bodily condition known as scurvy, and no condition is so prejudicial to an army in the field as this one. Every Medical Officer, nay, every Commanding Officer, knows what this means; how scorbutic dysentery runs riot; how the dangers from typhus, from cholera, and from typhoid fever are increased one hundred fold.

As to other causes of this dire disease, we know little except that it follows upon a deprivation of fresh vegetables, and upon a diet in which the nitrogenous elements is insufficient. Where vegetables are not to be had, lime-juice must be given; its good effects are too widely known to need further comment.

Returning now for a moment to the quantity of food that should be allowed to our soldiers, I desire to insist on the fact that Nature is a liberal, even a lavish, mother. When left to herself, she sows several hundred times more seed for her crops than men sow for theirs, and she gives infinitely more nourishment, animal and vegetable, than they require or can consume.

Nature is not always right. She is certainly not always economical; but is it wise for us to depart from her methods to too large an extent? Certainly we should no more stint our soldiers from whom we want

activity and energy, than we should stint a steam engine of fuel when we want steam. Some men eat more than others at all periods of their lives, but it is an almost universal rule that young and growing animals eat and require more food than those whose growth is complete. Hence the younger a regiment or an army, the more food it will require, and as our Army is now a very young one, it needs more food than was required when its average age was greater. If men get abundant food, they do not require stimulants, which is only, as far as beer is concerned, another form of food, bad in many ways, but seductive for various reasons. A wise Government should not leave so important a matter as the feeding of its soldiers to the chance of its being properly considered by a raw recruit.

The Government should, I think, provide the soldier with a full and complete diet, composed of meat, bread, vegetables, and condiments, all in due proportion. Government should likewise secure the proper cooking and serving of the food, and then the soldier might be safely depended on to do justice to his fare. As to the hours at which he should partake of his meals, we must remember that it is totally unsuited to the ideas and habits of the working classes of this country to have late dinners. The dinner hour should be, as heretofore, between 12 and 1 o'clock, but there should be a warm and substantial supper at about 6 or 7 o'clock. In fact the soldier should be fed just as the agricultural labourer used to be fed, in the days when there were agricultural labourers, viz., upon three meals a day:—

Breakfast between	7 and 8.
Dinner between	12 and 1.
Supper between	6 and 7.

In addition he should have a cup of coffee, and if possible a biscuit, before being called upon to do any unusually early work: it is not safe to send a young lad to work without food; the work is then specially exhausting to him, and he is more prone to be attacked by sickness under such conditions than if he had had some food. Perhaps this might be provided for out of the canteen funds. Also a fixed time should be allowed for each meal. I have known cavalry regiments in which the men had only ten minutes or a quarter of an hour to swallow their breakfast. This is decidedly wrong, and I am certain if Commanding Officers were aware how very injurious it is to hasten men and work them like this, they would not allow it. Not less than half an hour should be given for breakfast, and this should be *at the meal*. The time spent in going to or returning from their duties should not be included in this period.

Formerly, when the soldier was older, the need for all this attention to his food was not so great as it is now, but the neglect of it was often attended by its natural consequences, drink, ill-health, and shortened life. As regards alcoholic liquors, especially in India, the State should, I think, give the soldier less help than it does. Soldiers do not want encouragement to drink strong drink, but rather the contrary. The spirit ration is certainly a mistake. Some think that

good liquor is harmless, and that only the inferior kinds are capable of upsetting the stomach and brain. This is a fallacy. Alcohol interferes with the oxidation of the muscles, and with the power to repair their waste; in short it impedes their nutrition. As Sir Lyon Playfair says, "The wayward gait of the drunkard under the influence of alcohol is probably the result of a similar obstacle to change." All liquor, then, in excess is injurious, even if it be of the oldest and best.

It is a question whether it would not be better that ration bread should be made from whole meal than from refined flour, whole meal being more rich in nitrogen and fat than refined flour. The bread should be thoroughly well baked, and not eaten too fresh. At Netley the bread is baked in 2-lb. loaves, and a batch of 800 lbs. of dough is worked up into 398 loaves. Of these 4 are corner loaves, with four sides of crust out of the six; 16 are side loaves with three sides of crust out of the six; and 318 are inside loaves, with only two sides (top and bottom) of crust.

An inside loaf (two sides crust) gives about 16 per cent. of crust and 84 per cent. of crumb. An outside loaf with four sides crust gives 31 per cent. of crust and 69 per cent. of crumb. Taking the mean of all the batch of bread, we get of crust, 18.12 per cent.; of crumb, 81.88 per cent. The percentage of water-free solids in the crust is 90, in the crumb it is 63.

Now it is evident from these figures that the soldier does not get his proper due when the bread is baked in such large batches, or when the baking is insufficient. He then does not obtain anything like his proper proportion, and as this crust contains more nitrogen, he loses this, as well as in the weight.

In smaller batches the bread would keep far better, and it would also be much more nourishing if it were properly baked. Some change is needed in this respect. I do not think many of us would be content to get our bread each day with only the top and the bottom of the loaf crust, and this is one reason why so much of the soldier's bread finds its way into the refuse tubs.

I have made very many analyses of flour, and my experience is that the Government get good flour of its kind: it contains but a small proportion of water, and is rich in gluten. The great fault lies in the baking; often bitter yeast is used, and in the course of fermentation an acid is formed, in other words, the bread turns sour before it is issued. The acid of crust is 0.009 per cent., and the acid of crumb is 0.049 per cent., or about five and a half times more acid in the crumb than in the crust, which is another reason why there should be less difference between these two parts of a loaf. If bread does go sour, the excess of acidity is in the crumb. The crust also has great influence on the weight of a loaf, as it prevents evaporation, and when there is much crust, the entire loaf yields a less percentage of water.

Another supply which is frequently of very inferior quality is milk. I think it is probable that many of the anomalous cases of fevers which are seen from time to time might be traced to this source.

The death-rate at home from enteric fever is higher among soldiers than in the same class in civil life, although the soldier is living in many respects under far more favourable conditions.

If we take the total enteric fever death-rate for the Army in the United Kingdom, we find this to be 0·31 per 1,000 of strength, as compared with 0·28 among the males in the total population between the ages of 15 and 45 years; this is 0·03 above the civil population. On turning to Sir Charles Cameron's report on the Royal Barracks, Dublin, he states, "in most cases the supply," that is of milk, "proved to be of very bad quality." Adulteration with water ranged from 13 to 56 per cent. in the Royal Barracks, and from 15 to 50 per cent. at other barracks. This adulteration was not confined to the milk supplied to the men.

In the supply to the Officers' mess 19 per cent. of water was added, and a specimen of milk retailed in the barracks was found to be adulterated with 38 per cent. of added water. I am afraid Dublin is not the only place where such adulteration exists. Apart from depriving the men of a portion of their food, there is the danger of introducing specific disease through an adulterated milk supply. Some system should be adopted to secure a pure and wholesome supply—even at greater cost. The milk should be delivered in bulk and samples taken and tested, as is the practice, I believe, in many large institutions in civil life.

I now come to the question of meat supply, and this for the Army is a difficult one.

When the executive branch of the Army Service Corps buy their own cattle and kill them there is no difficulty in the matter, but when the contractor steps in, who often has secured his contract at so low a figure as to allow himself only a very small margin for profit, then the door is open for every sort of abuse. The remedy provided by the State for the protection of the soldier becomes under such circumstances an almost useless one. A Board of Officers assembles to pronounce whether the meat is fit or otherwise, and this they are ordered to do although they have received no training and cannot reasonably be expected to judge between different kinds of meat.

The means or tests of determining the quality of meat are imperfect at their best. Of course any one can tell whether meat is stale or putrid, but it is an exceedingly difficult question to decide whether a certain issue is too fat or too lean, or whether it contains too much bone, this being a question of degree, and there being no fixed standard. It is still more difficult to say whether a given specimen of meat has come from a bull or an old cow, from an animal that has died by acute disease, or from being choked by a piece of turnip. I have heard it said, although I cannot vouch for its being true, that there is a class of butchers who deal especially in meat from cattle which have not been killed in the usual way. This is a most important point, and we hope to instruct the young Medical Officers who join at Netley how to perform this duty of inspecting meat, so that they may be able to give advice on it when called on to do so. Unfortunately, it is only of late years that any attention has been

devoted to the influence on health of the flesh of diseased animals when used as food.

Professor Gamgee states that several cases of illness have come under his observation, produced by the use of the flesh of animals suffering from inflammatory diseases; and the Registrar-General for Scotland tells us that the mortality from carbuncular diseases has greatly increased since pleuro-pneumonia became an endemic disease among its herds.

It is a question whether at home pork might not be issued as a ration once a week, say, on Sunday. This is really a soldier's food. On certain occasions he gets it, on board ship for instance, as part of his ration, and he enjoys it. Married soldiers, who purchase their own food, constantly buy it. Why should it be denied to the unmarried soldier on home service? It contains a very large percentage of fat, just what his diet is generally deficient in. It is well worthy of trial, but care should be taken that the meat is sound and properly cooked.

In all meat supply the standard of quality should be raised. Meat is frequently on the borderland between good and bad, and it is impossible to condemn it as "unfit for issue." Yet no one would dream of purchasing such a supply for his own use. The animal should have been in good condition and the quality of meat the best; bone should never exceed 20 per cent.

I cannot help thinking that by always taking the lowest contract, temptation is offered unscrupulous dealers to palm off bad meat on the soldier. We know that prices are so cut down by the contractors tendering so low and risking any loss to obtain a contract, that it is out of the question for them to supply food of really good quality and also allow of a margin for fair profit. It also has the effect of preventing honest men from undertaking this work, which, by the stringent use of this rule, almost of necessity falls to the dishonest speculators.

The quality of meat is to be judged of by the character of the pulp or enclosed substance. The toughness depends on the connective tissue, which is most abundant in the ill-fed, ill-bred, and old animals. Young and quickly fed animals have more water and fat in their flesh, whilst older and well-fed animals have flesh of a firmer touch and fuller flavour, which is richer in nitrogen. All Officers in a regiment should be instructed in the terms of the contracts. If they did know them and really understood what the State requires, it would in a great measure dispose of the difficulties that so often are met with.

And now I come to the not least important point to notice—the cooking. Much of the inferiority of the soldier's food is due to defects in this respect. Considering how very important the subject is, it is surprising that the soldier is not instructed in the art of cooking, and I venture to say that this knowledge would prove far more useful to him on a campaign than proficiency in decimals or any other arithmetical fractions. Every soldier should be taught to cook his own food; it would not be difficult to do so, and the saving in waste

would well repay the trouble. At present the duty seems to be performed in a perfunctory manner—as a duty—and until some inducement is offered by increased payment, I am afraid it is hopeless to look for much improvement in this matter.

Those who have much more knowledge and experience than I have, complain that the present system is extravagant and wasteful. However this may be, the quantities of the articles used on certain occasions appear too large. To take one single item: flour for meat pies, say, for 60 men, is put down at 15 lbs.; it is found that 10 lbs. is ample. This latter forms a light thin crust, and allows the meat being properly cooked, in place of its being sodden and hard.

The object in cooking should be to render the meat more easy of digestion, but this, it is very evident, may be prevented if the cooking be so bad as to cause the meat to become a hardened solid mass, devoid of nutritive juices.

Time will not permit me to say more. It is only in these later days that even men of science realize the fact that the human body has to be fed with appropriate food and not be overworked; that whilst it may from one point of view be regarded as the highest integration of the physical, chemical, and other forces, it is subject to much the same laws and rules as are the other bodies of the higher animal series, and that if we wish to keep in health, we must conform to these rules.

General Sir ARTHUR HERBERT, K.C.B.: Mr. Chairman and gentlemen, having throughout the whole course of my career taken a great interest in cooking and in the food for the soldier, and having had the instructional kitchen at Aldershot under me when it started, I cannot quite agree with the lecturer that no attention has been paid to the food of the soldier, and that the cooking is as deficient as he wishes to make out.¹ The lecturer says that there is no variety in the food of the soldier. If he will look at the instructions that are given to the cooks, and at the

¹ I happened yesterday to have received a letter from an Officer who takes interest in the welfare of his corps, which shows that where attention is paid to the messing the men are well fed.

The following is a list of the meals taken from the messing book of a corps in Scotland:—

Breakfast, 8 A.M.	Dinner, 1 P.M.	Afternoon tea, 5 P.M.	Supper from 8 to 8.30.
March 10th, porridge	Sea pies, plum pudding	Every day..	Pea soup.
„ 11th, tea, 2½ oz. cheese	Irish stew and cabbage . . . .	..	Potato soup.
„ 12th, porridge	Meat pies and dumplings . . .	..	Scotch broth.
„ 13th, tea, 5 oz. saveloy	Sea pies and plum pudding ..	..	Lentil soup.
„ 14th, porridge	Baked meat and peas . . . . .	..	Pea soup.
„ 15th, tea, liver and bacon	Meat pies and dough nuts ..	..	Potato soup.
„ 16th, porridge	Baked meat and peas . . . . .	..	Scotch broth.

dietary in a regiment well commanded, he will see that the cook is obliged to show that the food is varied every day. I have inspected fourteen to twenty regiments in a season, and if the food had not varied the Commanding Officer would have been called upon for his reasons for having disobeyed the orders. I agree that in many regiments there is great carelessness, and that the soldier does not get as much food, or as varied, as he ought to receive. But, why is that? It is from want of supervision. If there is proper supervision, if the Officers do their duty, if the sergeants do their duty, without additional expense, the men have as good food as they can desire. When I commanded a brigade at Aldershot, I was on a Committee appointed to devise the best manner of cooking for the Army, and we tried experiments in two regiments. At first, the men objected to curries and certain other dishes we introduced; they wanted to have merely roast and boiled. I gave an order to go on with the system under trial, and after a month's time the men came round, and were delighted with the new modes of cooking. But I will tell you what occurs. When I commanded in Dublin, there were two regiments in the garrison; the one was well commanded, the cooking well looked after, and the charge for excellent messing was only 3*d.*; the other regiment paid 3½*d.* The one regiment had as much as they could eat; they had an admirable system, which without extra expense gave the men even what the lecturer has so ably suggested as being required, viz., suppers. Each man, instead of having tea, was given a ticket every morning by the pay-sergeant of his company, and for that ticket he could have at any time between 6 and 8.30 soup or tea, whenever he came home, in the recreation room, which was a most admirably managed institution. If he was out, and did not come in till too late, his ticket was available again for the next day, so that he could have a double share when he wished. The lecturer objects to the dress of the soldier. Having had the arrangement, under the Commander-in-Chief, of the dress of the soldier for some years, I am at a loss to know what fault he has to find with it. I beg to inform him that Dr. Parkes, who was a great friend of mine, was consulted about the service dress, and Dr. Parkes agreed most thoroughly that the patrol jacket, worn now in marching order, is about the best dress a soldier could wear. There is no army in Europe, and I have visited them all, that has a dress so loose or so convenient, or so easy round the neck. The Italian Army has a rolled collar, but it is hooked up tightly. The Prussian Army has a stiff and high collar, and so has the Russian. I cannot go into the fats and the salts, and that part of the lecture, because, as I do not understand chemistry, I take for granted the lecturer is perfectly right in what he has said on this subject. The question is, whether additional expense must be incurred to feed the Army, and I think he agrees that with proper care and supervision the soldier can be well fed without going to any additional expense, or reducing the Army. And it must be remembered if we go to the expense of adding a quarter of a pound to the soldier's meat ration the number of men will be reduced, because the country will not consent to add to the Estimates. I have been on full-pay serving with soldiers for forty-eight years, and I have never in any well-commanded regiment met with any outbreak of scurvy produced by the food the men received. The state of the milk supplied to the Royal Barracks, Dublin, has been referred to. I resided in the Royal Barracks when in command of the garrison, and during that time the medical Officers were good enough constantly to inspect the milk, and constantly to have it analyzed, and, therefore, if great adulteration exists, and no doubt it does from what the lecturer has said, it is from want of care and supervision on the part of the Officers. Contractors manage to deceive, and to do you, just as well when you kill your own cattle, as they do when the meat is supplied by contract. When commanding at the Curragh some years, we thought ourselves very sharp, and I had all the animals inspected the day before they were killed; yet complaints came to me that the meat was not up to the quality that it ought to be. I went down myself and saw the animals. I found them in excellent order; the next day I went round, and I found that the meat was far from what it ought to have been. It was afterwards discovered that the contractor, by bribing two of the non-commissioned officers, was in the habit of taking the good animals out of the dépôt after they had been inspected by the Board and by the Commissariat Officer, and during the night substituting old cows, which were killed and served out to the soldiers. There is

another little mistake that the lecturer made. The lowest contract is not always taken. Having for a number of years had to do with these contracts, I know that the Director of Contracts does not always take the lowest tender, if he has good cause to know or to believe that the person tendering lowest has been complained of, or has not given satisfaction. I have constantly had ration meat, and I have found the ration meat was not at all bad; in fact, the mutton issued at Aldershot was far better than the mutton I could buy in the town.

Brigade-Surgeon MYERS: Having served thirty years with the Army, though not nearly so long as Sir Arthur Herbert, I can say that the food has considerably improved since he devoted so much time and labour in watching over the interests of the soldier, both as to its quality and to the mode of cooking, and I think it is now universally accepted that it depends very much on the Commanding Officers of regiments how that food is supplied. With regard to the system adopted by Colonel Burnett, there does not appear to me to be anything specially novel in it, and there surely is nothing new in the fact that considerable nourishment can be obtained from bone when used for soup. The fact, however, that bullocks' heads can be purchased in the distant parts of Ireland for 1s. cannot apply to a large garrison like London, where the average price is 4s. to 5s. From the remarks of Sir Arthur Herbert it is obvious that many Commanding Officers have interested themselves in this question of the soldier's food of late years, and have done much also in promoting the soldier's interest in this matter, though, perhaps, such a systematic arrangement as Colonel Burnett's has not been adopted. With regard to bread, I do not agree with the lecturer, that the flour is of good quality. I have been told by Officers who have to deal with this matter that they cannot make good bread with bad flour, and certainly one baker to whom I showed a sample of flour the other day told me he thought it was very poor. I am, however, no judge of flour myself. There is one point with regard to the contractor. I certainly thought I was always instructed that the lowest contract had to be accepted: in fact I think I have seen it printed that the lowest contract must be accepted. Perhaps this has been altered in recent years. I should like to know is it or is it not a fact that a contract for food supplies may be rejected, and that the contractor may have to give up his contract in consequence, and yet in the following year he may again put in a tender, and if this is the lowest it is again accepted? I believe I know of a case in which that was done after one contract was rejected. Surely if a contractor's supplies are bad, and his contract is consequently rejected, he ought not to be allowed to tender again for some years. It seems to me that in such a case the contractor's name ought to be put down in a black book. With regard to the supply of meat, I can only say whilst I was in Dublin, where I believe the cattle were brought from Kerry alive, and were inspected by veterinary inspectors, the meat was far better than I have seen it at any other stations. I may also say I have heard, and now I believe it may be true, that at one station—not Dublin—cattle, after being passed, had been driven out at one gate, and old cattle driven in at the other, but until supported by what Sir Arthur Herbert has stated, I could not have believed it possible. Of course management may do a great deal, but chemistry proves one thing, the necessity of certain foods, and I think you cannot get over this fact, that with regard to the food supplies of the Army there is a deficiency of one important element, and that is fat. It is quite clear from these chemical analyses before us that fat is wanted, and really is a necessity. Now I have asked many soldiers, rather hoping that they would hold an opinion contrary to my own, if the meat supplied was sufficient: but if I have asked "Which would you rather have, a quarter of a lb. of meat, or butter?" they would say "butter." If I have asked them if they would prefer cheese to a quarter of a lb. of meat, they would say "cheese." The general rule is to say that they think they have enough meat if the quality were better. I know a regiment at this moment that has established small messes where the men can arrange their own grocery rations. They have messes of about twelve, and one of the chief things they get for themselves is butter. They buy it for their breakfast and tea. The only alteration is that the bread is diminished by a quarter of a lb. They like the plan immensely. Therefore we see what is wanted is an addition of butter to the food of the soldier. It not only supplies him with fat, but it does another thing, it saves great waste in the bread. You cannot expect soldiers to eat dry bread for

their tea ; it is wasted, they throw it away ; but if you give them a small portion of butter the bread is eaten, and consequently you supply them not only with the fat necessary, but also with good food that would be otherwise wasted. I therefore think it very important that a supply of butter should be added to the ration of the soldier. The grocery ration probably can be done more with than it is in many regiments, but surely not more than in the regiment which Sir Arthur Herbert spoke about.

Major FERGUSON, Rifle Brigade : I am sure that all present have listened to the lecture with great interest, and it is very satisfactory to find that science confirms practical experience in so many respects. Ever since I have been in the Army I have been in the habit of hearing that the ration was sufficient for the old soldier, but insufficient for the young soldier. The bread used to be thrown away by the old soldier, and very often picked up by the young, but the meat ration especially I have always understood was found insufficient for the young soldier. Now they are all young together, and, therefore what was formerly only true of a certain proportion of the Army is now virtually true of the whole. I cannot speak from recent experience at home, because I have been serving the last five years in Ceylon, where the meat ration was $1\frac{1}{4}$ lbs., certainly not of such good quality as meat at home, but the ration of meat was the best in the island, and the system was that recommended by the lecturer. The cattle were inspected, they were bought alive, the meat was not supplied after the animal had been killed. The Commissariat Officer inspected the meat every night. Proper precautions were taken to prevent fraud, and I do not think under the system it was possible for a dishonest contractor to make away with good beasts and replace them with those of inferior quality. There was one point the lecturer hardly touched on, and, I think, a very important one, and that is the connection between insufficient food and drink. I am sure the reason why men drink so much in the Army is mainly that they feel the want of food in the evening. It was very true what the lecturer said, that the working classes do eat, as a rule, a supper in some shape or form : their principal meals are the midday meal and the evening meal. Of course there is one other reason why men drink in the evening, and that is because they very often do not know what to do with themselves. I know in very many cases the one idea of pleasure to a soldier is to resort to the canteen in the evening, but if he was not empty, if he had not a sensation of "sinking," he would not drink so much, and he would not get drunk. I am in the presence of many scientific authorities, and therefore I speak with diffidence, but I think I am right in saying men very seldom get drunk in connection with a meal, and that delirium tremens would be almost unknown if men would not drink on an empty stomach. The drunkenness in the Army I think is mainly due to men going to the canteen and boozing, filling themselves with beer to make up for the deficiency of food. The evening meal at present, everybody knows, is a perfect humbug. I earnestly hope that such an evening meal as the lecturer indicated, from 6 to 7 o'clock—the hour being optional with the men—will be given. Of course we shall be met with the assertion that it would involve very great expense, but I am prepared to contend that in the long run it would be the truest economy. If the country will be generous in this matter it will be repaid with interest : we shall have far less drunkenness ; and everybody knows what follows upon drunkenness—disease, hospitals filled, men less efficient in peace-time and not to be depended upon in war. It is not only the effect on the soldier whilst serving that is so serious, but the effect on the nation generally. We are sending discharged men back into civil life every year in thousands. What is the effect which they produce on the general community ? I do not wish to inflict a temperance lecture on this audience, but I was talking on the subject of excessive drinking in the Army to an Officer who has just given up the command of a regiment, and although he did not quite agree with me in some respects, when I said, "I am afraid we are sending back discharged men every year in great numbers who, to say the least of it, are not a benefit to the community," he said, "Nine-tenths of them are men addicted to drink." I will add no more, except to repeat an earnest hope that it will be found possible to give the soldier an evening meal which will keep him in barracks and tend to make him drink less.

Colonel C. J. BURNETT, Royal Irish Rifles : I should not have risen to address the

meeting at all, except for the remark of one speaker in which he insinuated that I had advertised myself by publishing a letter containing my views on the ration question. I had nothing whatever to do with publishing that letter; it did not rest in my hands. I was simply working in the interests of the State and of the soldier, and I thought I was only doing my duty in letting the authorities who had asked me the question know exactly the truth of the experiments that I had carried out. I do not know hardly a soul in this room, but any man who knows me will tell you that is not my character. I have no wish to hold myself up as a mentor or teacher. I know there are regiments as good as my own in the Service; I know there are many Officers who have the same sense of duty that I hope I have; therefore, why would I set myself up to teach men who many of them are as good as myself? What I have done was solely in the interest of the State, and in the interest of the soldier. I was asked a straightforward question, and I gave a straightforward answer. I have been blamed, I know, for doing that; I have been told that I spoke before the time. I have been told that if it had not been for me the soldier would probably have got his extra quarter of a pound of meat. Why was I to hold my tongue, was I to prevaricate? I could not have held my tongue, because the report had to go in; I hope I could not prevaricate, I had to tell the truth, and I told it. There is a question about bullocks' heads—I assure you I am perfectly sick of hearing about bullocks' heads. You need not have a bullock's head to give a man a good supper. There are many other things which you can get if you study local surroundings, and I am sure that there are many regiments that have studied local surroundings, and have not confined themselves to bullocks' heads only. I do not care if I never see a bullocks' head, I can get other things which answer the purpose of the soldier, and suit equally well. I have a detachment at Sligo, where bullocks' heads cost 3s. 6d. each—they are not, of course, used, other things are got. All that has to be done is to exercise close and constant supervision; watch carefully over the interests of your man, see that what he gets he gets in the cheapest and the best market, and get as close to the source of supply as you can. See that what goes to the cook-house the soldier gets, because there is no doubt that pilfering does go on, and pilfering will go on unless you exercise close and constant supervision. You may have a very fine grocery book which will answer all the requirements of science, but it does not fill the soldier's stomach. The last speaker but one said there was great difficulty in supplying fat. The soldier has a great repugnance to fat. As a rule, he likes butter, bacon, and dripping. Now, I can tell that gentleman how certainly a very large proportion of fat can be procured free of any expense to the soldier. I took the trouble for some time to superintend personally the saving of the dripping in my cook-houses. I gave the result to the lecturer, which I have no doubt he will gladly show. I found, on an average, I had considerably over 100 lbs. weight of dripping a week; that amount of dripping enabled me to give a free issue of 2 ozs. a man to the whole battalion once a week, and to supply them with suet for their plum puddings, for their pie-crust, and for their fish pies. Again, people have objected that Mullingar is a cheap place. So it is to a certain extent, but there are many cheaper. Vegetables are dearer in Mullingar than they are in almost every part of England, that is to say turnips, carrots, celery, and that sort. We used to get in England a pound for $\frac{3}{4}$ d., in Ireland you pay one penny for them. Onions we get in England at $\frac{3}{4}$ d. a pound, in Ireland they are $1\frac{1}{4}$ d. Potatoes we have to pay 5d. a stone for, but if you ask in Mullingar from certain departments you will find that they are paying 8d. for almost the same potato. Milk, of course, is cheaper in Ireland, but when you have preserved Swiss milk for $4\frac{1}{2}$ d. you can make three quarts of very good milk, and can be perfectly certain it will be free from the adulteration which the lecturer has pointed out. American bacon costs the same everywhere, so do preserved meats and dried fish. As regards fresh fish Mullingar is very badly situated, but we get it. There was another question about the meat. I do not think that the Government do wrong in accepting a low contract. The terms of the contract are very plain and distinct; the meat must be good, wholesome, and well-fed. If a man contracts to supply that class of meat, he should be made to supply it. It is not the fault of the Government or of the person who drew up the contract, it is the fault of the man who receives it. I say the Commanding Officer is to blame if he

takes bad meat, and you may depend upon it if Commanding Officers would not take bad meat, the price of meat will go up, and the contractor will give the class that he has guaranteed to supply. There is an excellent substitute for butter in the shape of margarine, which can be procured at 10½d. per pound.

Dr. BALFOUR: I wish to call attention to an error in the paper with reference to the general greater prevalence of typhoid fever in the Army than in civil life. The author has forgotten in his calculation the marked difference in the age distribution of the men—that in civil life there is a much larger proportion between thirty and forty-five than there is in the Army, but when a man reaches thirty he has very nearly passed the limits within which typhoid fever generally prevails. To estimate it properly it ought to be calculated upon an age distribution in civil life corresponding with that of the Army. There is another point to which I should like to call attention, and that is the necessity for a more careful inspection of all stores delivered for the use of the soldier. When I was at Netley, I had at that time 400 men of the Army Hospital Corps who were being drilled and trained. I looked very carefully to the supplies furnished for them, and I found the coffee which was supplied for their breakfast contained 40 per cent. of chicory. I objected to it, and through the Control Department, then the Supply Department, of the hospital, I got the contractor to furnish the coffee in the bean, roasted. After one or two bags of coffee had come in, I found that he was sending in coffee beans in which there was scarcely any substance at all; it was almost simply the shell of the bean. Of course, I condemned it, and then he threatened to revert to the supply of it ground, which was what he contracted for. I merely called his attention to the penalty for adulteration, and during the remainder of the time I was there we got an extremely good coffee bean supplied for the men. I may also mention with regard to the tricks of contractors that one day we found some meat which had been sent in for the use of the hospital, and condemned, was being quietly smuggled in through the back door to be supplied again. I had it immediately seized; I sent for the Health Officer of the district, and had it condemned and buried, and I do not think the butcher tried the trick over again. The importance of attention to cooking cannot be over-estimated. When I was appointed to the Duke of York's School, I found the boys in a very low state of health. One of the first things I did was to attend to their dieting. I found the cooking was as disgraceful as it possibly could be. In the course of twelve months, with an increase to the amount of food supplied to the boys of only 2 ozs. a week, I got them into thoroughly good condition, and it was, I believe, very much the result of two things, first, that I introduced more variety into the dietary, and next that I took care that it was most thoroughly and efficiently cooked.

Surgeon-General MASSEY: With regard to the 4-lb. loaves, I may state that the Committee recommended that they should be 2-lb. loaves. I do not wish to enter into this matter at all, because being on the Committee I may be supposed probably to say things that I ought not, and to give the opinions of the Committee. But that is one point, that these 4-lb. loaves have now been made into 2 lb. loaves, and the cost of that has been 5,000%. a year.

Lieutenant-General Sir R. HUME, K.C.B.: The great value of this lecture, apart from its inherent ability, is that it tends to show the public the interest that is taken in the well-being of the soldier. I think the more care that is taken of the soldier after he has enlisted, the better. The lecture we have had to-day, and the discussion that is following it, will have a very great effect on many people outside, who really are entirely ignorant of what is done with the soldier after he has enlisted. Since I have been unemployed, in a military sense, I have had the opportunity of meeting many more people out of the military track than I ever did before, and it is astonishing the utter ignorance that prevails through nearly the whole of the English nation as to the social state of the soldier after his enlistment: they really seem to know nothing about it. Therefore, I think this lecture to-day, in continuation of the many lectures that take place here on different military subjects, will be a most valuable one. With regard to some of the things the lecturer has stated: in the first place I can quite understand his remark about cooking; what he wishes is, that the knowledge of cooking should be more general and not confined to the trained cooks, who, I must say, are admirable. It would

certainly be a very great thing if individual soldiers were more trained in cooking. But then there are so many things they have to be trained in nowadays that they really have not got time for everything, and you must delegate the cooking in a regiment, as far as I can see, to a certain number of trained men. Of course, the more you can extend the education the better. I was at Portsmouth a short time ago with my old regiment (55th, now 2nd Border Regiment), and the Quartermaster, who was Quartermaster in my time, took me to the cook-house, and to see the men's dinners, with great pride, because, he said, "We used to think in your time that we cooked pretty well, but I think you will see a great change for the better now," and I did. I saw the men getting fed in such a way as they never had been in my time, although I thought they were not badly cared for then. There is not the slightest doubt that there has been a great improvement in the cooking. With regard to the things that are not supplied by the Government, of course, as Colonel Burnett said, you must depend on your local supply entirely. All these are details which are carried out by Officers commanding regiments. With reference to the Officer who spoke a short time before Colonel Burnett, I did not understand him to wish to say anything at all offensive to Colonel Burnett, but what it struck me he meant was, that this is a point which is attended to by many Commanding Officers. I do not think it was meant to say that Colonel Burnett had thrust himself before the public in any way, but it was merely remarking that it was not confined to one Officer. With respect to the whole subject before the meeting, I do not think that there is any of greater importance, or, as I said before, whose consideration will have a better effect on the outer public, and through the outer public on the Army, than the question we have discussed now. The Army is now getting out of its very young soldier state, and it appears to me that the rules for enlistment and for service now, if they are looked at, will be found very different from what they were eight or nine years ago. Many soldiers now have an opportunity of becoming old soldiers, which they had not then, and I am glad to see, as far as I can understand, that the time of service of the men in the Army is gradually returning to a much longer period than it was some few years ago, therefore, we have not got to legislate entirely for a short service army, and I heard my old sergeant-major tell the Commander-in-Chief and the Quartermaster-General at Portsmouth the other day, when the Commander-in-Chief asked him about the meat ration: "The meat ration is entirely sufficient for the old soldier, but for the growing boys it is not sufficient." There was a remark made by an Officer about the excessive drinking in the Army. Now, from my experience in the Army and my experience of civil life, I do not think that drinking in the Army is in excess of drinking in civil life; but I think the amount of drinking *detected* in the Army is excessive in comparison with what is detected in civil life. This has always been my opinion, and I am very glad to have an opportunity of saying so to-day. I feel very much obliged to the lecturer for his paper, which I have no doubt will be of great use to many of us individually, as well as to the Service generally.

Major FERGUSON: I can assure General Hume I was not thinking of his regiment or of my own in adverting to the much drinking. I have only just come home from abroad, and I spoke more of regiments I have seen abroad, but, if I may take the opportunity of saying so, I did have the pleasure of seeing General Hume's old regiment the other day arrive in Portsmouth, and 300 total abstainers sat down to a tea, so that I know that his is a singularly sober regiment.

Brigade-Surgeon MAUNSELL: With regard to the bread supplied to the soldier, particularly at Aldershot, I should like to say a few words. Within the last few months 2-lb. loaves have been supplied to the soldier. These loaves are formed like cottage loaves, so that there is crust all round, the consequence is the bread is excellent. I attended before the Committee the other day and brought up two of the loaves, hospital bread and ration bread. I showed them to the Ration Committee, of which Surgeon-General Massey is a member. This bread was very good, in fact, you cannot get better bread. I eat the hospital bread myself always. The ration bread is not so palatable as the hospital bread, because it is made from seconds flour. The difference in the price of the two breads is $\frac{1}{10}$ d. per lb., and I think if ration bread were made from hospital bread flour, it would cost about 5,000*l.* a year more. I think if the bread were made in 2-lb. loaves, as it is at Aldershot,

that you could not get better bread, and the men eat it all. As an illustration of the difference in the bread now and what it was some months ago, I may say that from a battalion in Aldershot some time ago, 100 lbs. weight of bread was taken away in the swill-tub. I traced that bread from the swill-tub to the farmer who bought the swill, and I have seen strings of unbroken loaves in the swill-tub at this farmer's; he was feeding his pigs on the bread. I have also found in the farmer's yard a lot of baker's bread, which was taken away in the swill, which seemed to prove that the bread was wasted very much in the barracks. Therefore, I say, the purchase of bread out of the grocery money is not necessary. With regard to the cooking, I very often go round the kitchens, and I find at Aldershot, in the Central Infantry Block, where the cook's class is, the infantry regiment is fed much better than any other regiment in camp. The cooking is better and more varied. The King's Royal Rifles who are there now have a most excellent messing. Three days ago I saw their dinner. They had curries which were as good as could be. I then went up to the huts in the South Camp and looked at the dinners there, and the cooking was nothing like so good. There are two reasons for this: the first is they have not sufficient fuel, and the second is that they have not cooking arrangements enough to vary the dinners. Something has been said about the dress of the soldier. I think Sir Arthur Herbert said the soldier was very well clothed. I am sorry to differ from him. The civilian when he presents himself as a recruit wears clothing weighing from 7 to 11 lbs. 8 ozs. He comes in as a recruit, and we put him into a suit of clothing which weighs as low as 4 lbs. 8 ozs. Now I have weighed the clothing of recruits who come up to the Cambridge Hospital, young soldiers; the last clothing I weighed was in October, 1888, and one suit of clothing weighed 4 lbs. 8 ozs. (date of issue 1.9.87), another 5 lbs. 1 oz. (date of issue 1.6.88).

Sir ARTHUR HERBERT: What clothing had he?

Brigade-Surgeon MAUNSELL: A serge suit.

Sir ARTHUR HERBERT: They do not wear serge clothing in England at all.

Brigade-Surgeon MAUNSELL: That is what they come to hospital in.

Sir ARTHUR HERBERT: A line soldier?

Brigade-Surgeon MAUNSELL: A line soldier; he wears a kersey. This was a soldier of the Yorkshire Regiment. It does not much matter what you call it, but that is the weight of it. The correspondence is in the hands of Sir Evelyn Wood at present. It astonished me when I compared the civilian's clothing when he comes up to enlist and the clothing of the soldier as he presents himself at the hospital. The articles of clothing weighed were his kersey, his shirt, and his trousers.

The CHAIRMAN: I think I must ask you to remember that we are talking about rations, not about clothing.

Surgeon-Major NOTTER: I have very few words to say in reply. First as to clothing. What I meant to say was that the continual movement in working-men with the chest exposed was far and away less exhausting work than it would be if tied up in a collar such as we have now nearly lost, but not quite. Where there is free play of all the muscles the work done is far and away less than in the constrained position of ordinary drill. I did not want in the least to reflect upon the clothing, which for a soldier I believe is as good as it could be. In the same way as to monotony of diet, my remarks did not apply to the present day. I spoke more of monotony of diet in the past, and I did not mean to single out Colonel Burnett's system as being exceptional, but as showing the change that had latterly come over regiments, the interest Commanding Officers as a whole had taken in the subject of the soldier's food, and the results which had followed from their close attention to the matter. As regards the lowest contract, I may be mistaken, but I think it is in the "Commissariat Manual." I have not got it here.

Sir ARTHUR HERBERT: The Commissariat do not take the contracts, it is the Director of Contracts. All contracts of meat are made by the Director of Contracts. In the Commissariat you are quite right, but all contracts for meat in England are made by the Director of Contracts.

Surgeon-Major NOTTER: I did not mean meat alone, I meant contracts for flour, groceries, and for supplies in general, and I think there is a paragraph in the "Commissariat Manual," that is what made me say it. I think I showed pretty

clearly that there is ample fat in the diet given, 3 ozs. of fat in the day. There are actually 4,700 foot-tons of potential energy in that diet, and it is utterly unnecessary to supplement that with butter or anything else. I have also a statement here of the amount of dripping which was saved in February in the cook-house of the Royal Irish Rifles, Colonel Burnett's regiment; 378 lbs. 10 ozs. were saved during the month and distributed; this gave over an ounce of fat per man daily, and raised the fat up to the scale we have here, which is ample for every purpose. What Sir Robert Hume has said is quite true, the young soldier does not drink. I have had ample opportunity of seeing this. I was in camp where there were upwards of 3,000 of these young soldiers, and it really was the exception to find it. The young soldier spends his money upon food, as a rule, and not upon drink. The Army is a sober army as an army, I take it. Brigade-Surgeon Maunsell has simply followed up the principle that I suggested about the bread. Everyone knows the old bread, which had only tops and bottoms, of which the bottom was harder than a board, and the bottom generally went into the swill-tub. My object was that there should be a regular proportion between crust and crumb, which should as nearly as possible assimilate to what we get in civil life. I advocate no extraordinary change in the meat ration; the meat ration if properly used is ample, and there is no necessity to put the country to the expense of extra food for the soldier.

The CHAIRMAN (Sir T. Crawford): Gentlemen, as time is running very fast to the period at which the debates usually close, I will not trouble you with any general remarks with regard to the ration. There is one great advantage in these lectures, particularly when given by gentlemen who understand the scientific principles upon which men should be fed, that it does diffuse a certain amount of scientific information throughout a broad audience, and that is particularly the case with everything stated in this theatre. We have, fortunately, an exceedingly well-managed Journal, through which some admirable papers from time to time find their way into the hands of the whole of the Army, and it is a great advantage that this subject in particular should be dealt with here in a scientific as well as in a practical sense, and that it should find a record in the Journal. I would like to say one or two things in regard to the paper, as I am like some of the speakers who have addressed you this evening, not without some experience in the Army in this as well as in other matters, and in other countries as well as in this. I agree with those who have said it is essential to feed the young soldier well. I agree also that the ration in the main is sufficient, provided it be of good quality, and I thoroughly endorse what Sir Arthur Herbert and others have said, that it is in the hands of the Officers of the Army to secure that for the soldier without a penny more expense to the State. I agree also in everything that has been said about cooking. The Army is enormously indebted to Sir Arthur Herbert and others, who have taken an interest in establishing the School of Cookery, and managing it, at Aldershot, and I am only sorry that a suggestion of my own that all these depôts at home should have a first-class cook on their establishment was not carried out. I think it is one of the essential requisites of depôts of regiments at home that their kitchens and their cooking establishments should be unquestionably of the very best. I think also with regard to the distribution of meals, that if the soldier had three good meals at properly regulated hours, he would have all that the soldier really requires, and that he may have that Colonel Burnett has shown by his practical way of dealing with this question. I am sure the Army at large, and the audience in this theatre, will agree with me in saying that Colonel Burnett's agitation of this question, and the practical way in which he has looked at it, has done a vast amount of good, but I do not think anybody would think for a moment that the idea of advertising himself has had anything whatever to do with Colonel Burnett. The fact is his letter was so good that the Commander-in-Chief could not do otherwise than publish it for the Army, and the publication of that letter, and the discussion that has resulted from it, and the practical steps taken in consequence of its promulgation have already done much good in the direction in which reform is needed. With these very brief and cursory remarks I will ask you to bear with me while I propose a vote of thanks to the lecturer. I am sure we are indebted to any gentleman who will take the trouble of writing out a carefully prepared paper and laying it before such an audience as this. I will take it for granted that you carry this resolution by acclamation.

Wednesday, April 3, 1889.

GENERAL G. ERSKINE, Chairman of the Council, in the Chair.

THE RECENT CHANGES IN THE DRILL OF THE GERMAN ARMY.

By Colonel LONSDALE HALE, Ret. R.E.

In the year 1872, shortly after the termination of the Franco-German War, the latest changes made by the Prussians in their Infantry Drill Book formed the subject of a lecture delivered in this theatre by the late Major E. M. Jones. In 1876, a new edition of the Infantry Drill Regulations of the Prussian Army and officially called a "reprint" of the old Regulations which bore the date 25th September, 1847, was issued to the Army. The leading features of the "reprint," and the alterations it introduced are given in a paper contributed to the Occasional Notes in the 88th number of the Journal,¹ by Lieutenant-General (then Colonel) E. Newdigate, now commanding in Bermuda. The Council of this Institution, when arranging the programme of lectures for the current session, had before them the desirableness of bringing the information on this subject up to the present time. They consider that the lectures delivered here should not only deal with matters of passing interest, but should be standard sources of reference in future years. Inasmuch then as a fresh edition of the Drill Regulations was issued in September of last year, and moreover the publication of this edition drew on it the attention and criticism of soldiers all over Europe, the Council determined to include in their programme a lecture on it. Most unfortunately, however, owing to causes to which it is unnecessary to refer, difficulties arose which resulted in the withdrawal of the lecture. Strongly impressed with the desirableness of this particular subject being brought before the members of the Institution, I undertook to obtain another lecturer. But the difficulty of finding one was very great, for English Officers who really understand technical military German are few and far between. It so happened, however, that I was aware that a brother Officer, an old friend of mine, who is a thorough master of the German language, had most carefully compared the old and the new Drill Book, and had reduced that comparison to writing. On stating my difficulty to him, he, whilst declining to lecture himself, most generously placed the results of his labours at my disposal, and those I am about to lay before you. I, gentlemen,

¹ See vol. xx, p. 719 *et seq.*

am this afternoon merely the mechanism of the telephone: the utterances are those of "one who knows," but for the correctness I, with perfect confidence, hold myself responsible.

At the outset it is necessary to impress on your minds the marked distinction between the edition of the Drill Book which we are considering to-day and the editions which preceded it. The earliest of the latter bears the date 25th September, 1847. In the German Army there exists, side by side, a keen desire for progress on the one hand, and on the other hand a clinging to the traditions of the past. Hence the edition of 1876, necessitated by the altered conditions of warfare, as shown in the campaign of 1870-71, was officially called a "reprint." It resembled a tree planted some thirty years before, on which had been grafted cuttings which would bear fruit suited to the military tastes and desires of later date. Consequently, that edition was full of anachronisms and modern ideas in strange juxtaposition, the former predominating, and the result being contradiction and consequent confusion. Practically, it contained two antagonistic and irreconcilable systems: one based on the war experience of bygone days, the other on that of modern war. Of the many illustrations of the predominance of the old ideas, one will suffice, that of the retention of the battalion directed by the battalion commander's word of command, as the tactical unit. Reference to the table of contents (Appendix No. 1) shows us that out of 195 pages dealing with the instruction and training of the individual soldier, the squad and company, the battalion and the brigade, 89 pages or nearly half are devoted to the battalion.

The retention of the battalion as the principal fighting unit was due to close formations being still regarded as fighting formations, and suitable for employment within reach of the enemy's fire. This becomes apparent from the numerous evolutions in close formation laid down for the battalion, many of which carry us back to the days of the Great Napoleon and the Peninsula, when, being admirably adapted to the tactical conditions of that period, they produced excellent results.

The much needed reform was initiated by the late Emperor, who did not, however, live to see the fruit of his labours, and it was reserved to his son, the present Emperor, to complete the work by the issue of a book which is not a reprint, not even an improved and revised edition; it is an entirely new creation, differing from its predecessors in many essential points and in most minor details. The statement of the Emperor's views regarding it runs as follow:—

"Berlin, 1st September, 1888.

"I issue to the Army these new Infantry Drill Regulations, in grateful memory of His late Majesty, my father, to whose initiative their production is due. Their object is to produce a larger scope for war training, maintaining at the same time the discipline and order which have been handed down to us.

"The advantage gained by the simplification of many of the formations must on no account be nullified by any one, either by verbal

or written additions to the Regulations for the purpose of obtaining increased outward uniformity, or for any other reasons.

"The freedom purposely conceded in the training and its application should in no way be limited by any restrictions affecting the principles of these Regulations.

"I am firmly resolved to punish with dismissal any contravention of this my will.

"Any infringement of the provisions of Parts I and III will meet with severe censure, while any misapprehension of Part II should be rectified by means of instruction.

(Signed) "WILHELM.

"*To the War Ministry.*"

It is interesting to notice the influence of the national spirit in these Regulations. Having effectually shaken off the yoke of their enemies, the Germans are determined to get rid of the last trace of the French domination by purging their language of all germanized French words, thus carrying into effect the spirit of these German lines :—

Willst du ein echter Deutscher sein
So sprichst du deine Sprache rein.

freely rendered—

Wilt thou be a German true
Cleanse thy language thro' and thro'.

There is even a marked progress in this respect, since the issue of the "Field Service Regulations, 1887."

The following are some instances of this change :—

Old word.	New word.
Honneurs	Ehrenbezeugungen.
Attache	Sturm.
Avertissement	Ankündigung.
Engagement, action ..	Gefecht.

There is one word of foreign sound and curious application still retained—*i.e.*, "chargiren"—in the words of command for firing.

Most striking also is the systematic and logical recasting the work has undergone. Its arrangement and teaching are as lucid, simple, and concise as those of the old book were complicated and diffuse. It moreover numbers 57 pages less.

But if one thing more than another shows the completely new departure taken, it is the relative amount of space allotted to the drill and exercises of the several units in the book of 1876 and that of 1888. A brigade consists of 3 or 4 regiments, a regiment of 3 or 4 battalions, a battalion of 4 companies, a company of 3 züge, the company being about 200 strong. Look now at the comparative statement in the table :—

	No. of Pages.	
	Old.	New.
Individual Training	35	31
Zug	0	22½
Company	37	17½
Battalion	89	10
Regiment	0	7
Brigade	35	5½

In itself the table is a revelation. Leaving out of consideration the item individual training, which remains as before, we see that to the regiment a few pages are given, but the brigade retains but one-sixth or one-seventh of its former importance, the battalion only one-ninth. The reason of this is that henceforth the company is the only fighting tactical unit, and battalions, regiments, and brigades are regarded on the battle-field merely as concentrations and assemblages of the fighting units, the companies, whence they may be drawn for the purposes of the combat. And the reduction of space allotted in the book to the company, as a whole, is more than made up by that given to its third, the zug, the lowest unit under an Officer's command, and consisting of some sixty-four men which, hitherto unrecognized, now springs into the first place.¹

The subjects connected with the forming, handling, and legitimate employment of the soldier are divided into three parts:—I, The School; II, The Fight; III, Parades, &c.

Out of a total of 169 pages, he is taught his lessons in "The School" in 80 pages, he is shown how practically to apply these lessons in "The Fight" in 52½, and in 27½ pages Part III provides for the few necessary show parades inseparable from the profession of arms.

Part I, "The School," is further subdivided into six sections, one for each link in the military chain, that may be called upon to bear the strain of war and act independently as a fighting unit. These are—A, "The Individual Soldier;" B, "The Zug;" C, "The Company;" D, "The Battalion;" E, "The Regiment;" and F, "The Brigade."

The training of the individual soldier consists of instruction with and without the rifle, and as a unit of the fighting line. That of the zug and company, in which everything connected with the actual fighting is done, consists of instruction in close and extended formation.

The key to Part II, "The Fight," lies in the number of pages respectively taken up by the three subdivisions composing it. The total number devoted to "The Fight" is 52½. Of these nearly three-quarters are allotted to the first subdivision dealing with "General Principles." The second subdivision treats of the fight of the several tactical units, "The Company," "The Battalion," "The Regiment," and "The Brigade," and is contained in 13½ pages, each unit taking up about the same amount of space, the company having the largest

¹ By "unrecognized" is not meant that the zug itself did not exist, but that as a fighting unit it was not recognized in the Drill Book.—L. A. H.

number with 4 pages. The "Concluding Remarks," not the least remarkable part of the book, occupy 3 pages, and form the third and last subdivision of Part II.

Even Part III, "Parades, &c.," which bears a certain resemblance to its obsolete predecessor, has not been left untouched by the hand of the reformer. It comprises four parts: (A) The Parade, (B) Taking out and replacing the Colour, (C) Bugle Calls, (D) Brass and Reed Bands.

The Preface, the three Parts, and the three Appendices, No. 1 Bugle Calls (21), No. 2 Drum and Fife Marches (12), No. 3 Sundry Calls on the Drums and Fifes (12), make up the contents of the German Infantry Drill Regulations, 1888.

The object throughout these Regulations, which becomes particularly apparent in this part, is not to seek to provide for every conceivable contingency, thereby burdening the memory with numberless details, but rather, thoroughly to furnish the mind with sound principles of general application. That is the clue to 36 pages of 56½ being devoted to the general principles, in this most important part of the German soldier's instructions. There is no "Rule of Thumb" work here. Here we find nothing but living principles, deduced after much thought and labour from real modern war, not by the theorist, but by the practical soldier who has proved his quality in field and cabinet, requiring the exercise of reasoning powers and application of judgment and common sense.

Drill and Training.—No better introduction to the drill and training of the German Army could be found, than that given in the book itself, from which the following is an extract:—

1. The object of drill is to train and prepare both Officers and men for war. All exercises should therefore be in conformity with war practice. The most important requirements of war are strict discipline and order, together with the utmost exertion of physical and mental powers. The development of these qualities to such a degree that they become a second nature to the men, is one of the principal objects of all exercises at drill and field practices.

It is only by simplicity that results are ensured in war. It therefore becomes merely a question of mastering and practically applying a few simple formations. These, however, should be practised with strictness, and directed with certainty and precision. The provisions of the Regulations deal solely with normal formations, and are unconditionally binding in their spirit and letter, in peace as in war. All artificial elaboration is prohibited.

2. All commanders of troops from the Company Commander upwards, are responsible that the training of the units under their command is carried out in accordance with the Regulations, and they should therefore be restricted as little as possible in the choice of means. Their immediate superiors are *in duty bound* to interfere the moment they notice any errors or shortcomings.

Each section of Part I we shall now deal with in succession, commencing with Individual Instruction, and taking then the zug, the company, and then leading on to the brigade.

PART I.—A. *Individual Instruction.*

The spirit of the training imparted is aptly described in the last clause of the concluding Remarks to Part II: "The training of troops may properly be considered as successfully accomplished, when they are capable of performing what is required in war, and when no part of what has been taught on the drill ground has to be laid aside on the battle-field."

In the old Regulations the instruction of the individual soldier was scattered over Parts I, II, III, and IV; the whole of it is now embraced in Part I, Section A. Every section and subsection that requires it, is preceded by pithy "General Remarks." These shall be given in full.

§ 1. "The careful and strict individual instruction which should be conducted concurrently with the physical training prescribed in the Gymnastic Regulations, is the foundation of the soldier's training as a whole. The requisite combined action of numbers can only be attained by the thorough instruction of the individual. The faulty and incomplete instruction of a recruit, as a rule, affects him prejudicially in the performance of his duties, during his entire service. Faults which are allowed to creep in during the initial stages of the instruction, are rarely completely eradicated. It is likewise impossible to remedy defective instructions by means of combined practices."

These words, together with the amount of space allotted to this subject, give us an inkling of the importance attached to this first moulding of the young soldier,¹ and a further examination will convince us as to the soundness and practical character of the instruction imparted.

Appendix No. 2 shows us what has been abolished in this portion.

With a view to lessening fatigue on the march, the command "Ohne Tritt," or "Out of step," is given. The men are thereby relieved from the necessity of accurately keeping the Regulation step. The normal distance (from back to breast) between the ranks is then increased from 0.64 to 0.80 m. (25—31½ inches). The men, however, maintain the regulated pace, an orderly bearing, and their proper places in the ranks. On the command "Tritt gefasst," or "In step," the ordinary step and distance is resumed. In marching off "out of step" the command is "Ohne Tritt—Marsch," or "Out of step—March."

With regard to instruction in "Firing," the most important portions of the Musketry Regulations bearing upon the effective use of the rifle in action, with which it is essential the soldier should be perfectly familiar, are inserted bodily in the new Regulations.

In peace-time, bayonets are no longer fixed, and it is considered sufficient that the soldier should be instructed in "fixing" and "unfixing;" the object being doubtless to save the rifle. On all occasions, however, in which bayonets would actually be fixed in battle, the order to "fix," either by command or bugle-call, should invariably be given, without its being carried out by the men.

The most important part of the training, being that for the fight in

¹ See "The Training of the German Recruit," in No. 147 of the Journal.—ED.

extended order, let us hear what the "General Remarks" have to tell us as to the methods adopted:—§ 64—66. "In order to render the recruit familiar with the rudiments of the independent use of the rifle, it should be placed in his hands a few days after he joins and before being instructed in the manipulation. The instruction on the several parts of the rifle and their combined working, should go hand in hand with that in loading, the firing positions, and aiming.

"After the soldier has made some progress in loading, the firing positions, and in carrying the rifle at the slope, and after he has obtained a clear grasp of the first principles of subordination, the instruction in extended order fighting should be proceeded with.

"For this purpose, he should be made to acquire the rudimentary notions of the nature of fighting in extended order, by affording him opportunities of observing the working of small parties of older soldiers, over easily accessible ground.

"His zeal for, and powers of understanding the highest objects of his calling, should then be stimulated and sustained, by making him take an active part in representations of the simplest phases of the fight.

"His duties in the attack and the defence, and the manner of turning the nature of the ground to account in increasing his own fire action and reducing that of the enemy, should be taught him by means of an opposing force, at short ranges to commence with.

"These exercises can be carried out at all times of the year, on the field-practice ranges and on the drill ground. After the recruit has served two or three weeks, he should be taken out for this purpose into the country at least twice a week. This is a decidedly beneficial change during the period of formal drill instruction, which can best be furthered by the recruit bringing with him a certain insight into the practical application of the extended order formations practised on the drill ground.

"In regulating and directing these field practices, the difference of the demands made upon him in the formal exercises principally connected with close formations, and those connected with extended formations, should be explained to him.

"Plenty of time should be allowed for the careful and thorough training of the soldier, as it cannot be effected if the course of instruction is unduly hurried over and repetition is to be avoided.

"It will soon become apparent which men are particularly smart. The greatest attention should be devoted to the training of these men with a view to appointing them *zug* and section leaders in due course. Awkward men must not be permitted to retard the progressive instruction of the class they belong to."

It is laid down, that the men should be practised in surmounting obstacles of all descriptions, and be thoroughly trained in taking advantage of cover. They should, however, be taught that in the majority of cases the straight way is the best way, and that a considerations as to cover should give way to those regarding fire action.

Theoretical musketry instruction and judging distances should go

hand in hand with this part of the instruction, followed by blank and ball firing.

PART I.—B. *The Zug.*

Now, for the first time, the zug is given its legitimate place in the Drill Regulations. It is recognized as a real fighting unit, and assumes its duties and responsibilities. On the completion of the individual training of the recruit, say the General Remarks, § 81, he is formed up with several others in line, files, sections, and is prepared, by being exercised in züge, for taking his place in the company, in close as well as extended formation. In the zug as well as in all larger units, the same certainty and order should prevail, whichever rank may be in front or whichever flank is leading. The zug should also be able to execute all regulation movements in perfect silence even when in an unusual order, with files intermixed (termed “unrangirtes exerziren” or drilling in “mixed order”), “in step,” and “out of step.”

The zug, formerly the half (in close formation) is now the third of a company, and is commanded by subaltern Officers, called zug leaders.

It is now formed in two ranks instead of three, both sized from the right, the tallest man of each file in front. The lateral space occupied by the soldier in the ranks is not laid down. It is merely stated that he should in all cases, even on parade, have a light touch of the elbow with his right and left-hand men. This will enable him to fire and execute all his movements in the ranks without constraint.

A zug of sixteen files and over is divided into half-züge, and the half-züge again into sections, which in extended order are called groups. A zug of fifteen files and under is not subdivided into half-züge. In either case the section should not consist of more than six or less than four files. The sections are numbered from the right of the zug. The zug leader stands in front of his zug when working alone. A flank non-commissioned officer is placed on either flank of the front rank, the remaining non-commissioned officers two paces from the second rank, standing in rear of the last file of the section they command in extended formation.

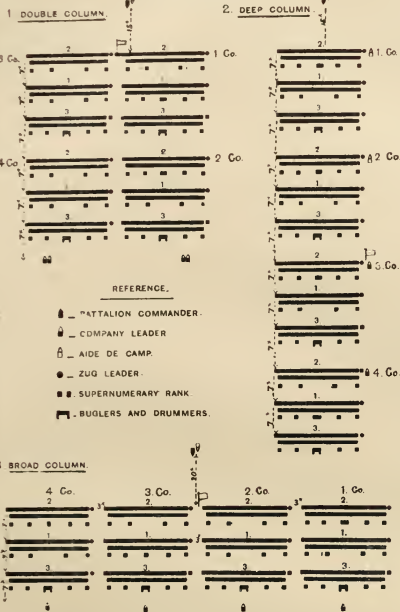
The evolutions performed by the zug in close formation are shown in Appendix 4.

The dressing is always by the right (unless specially ordered otherwise). The men are practised to form up rapidly on points (the flank non-commissioned officers) or on files. A good advance of the zug in line over considerable distance, is considered the foundation of all movements in close formation. In file marching, the front rank directs. Marching in file is used for short distances only, as it entails great exertion, having to be executed “in step” so as to retain the proper distances.

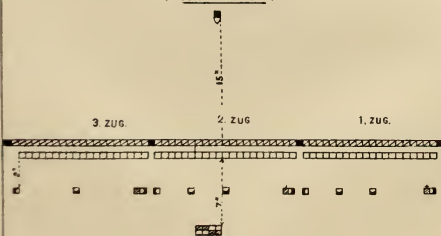
There are two new terms, “Ziehen,” to denote the diagonal march, and “Hakenschwenkung,” a change of direction in column, each component part wheeling in succession on reaching a given spot.

No. II.

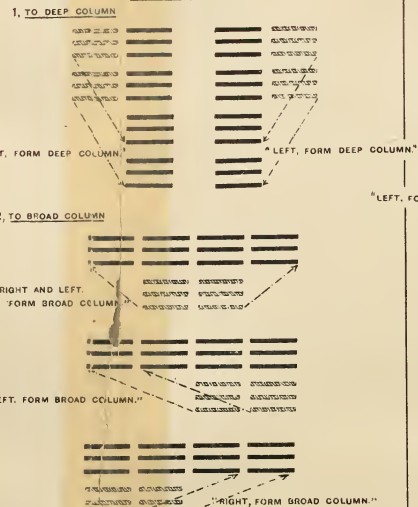
THE BATTALION. NORMAL FORMATIONS.



1. COMPANY IN LINE.



FROM DOUBLE COLUMN



No. I.

THE COMPANY. NORMAL FORMATIONS.

2. COMPANY IN COMPANY COLUMN.



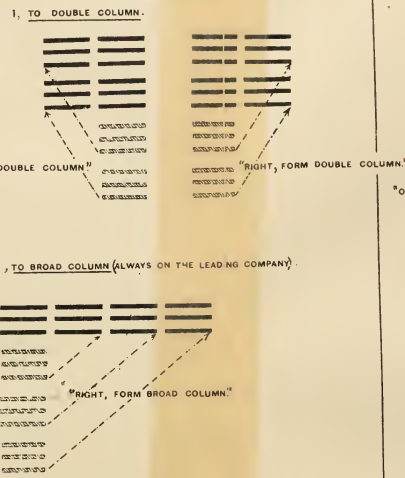
REFERENCE.

- - COMPANY LEADER.
- - LIEUTENANT.
- - COMPANY SERG-MAJOR (FELDWEBEL).
- - GADET (PORTEPEE FAHRNICH).
- - ASSISTANT COMPANY SERG-MAJOR VIZEFELDWEBEL.
- - SUPERNUMERARY N.C.O.
- - RIGHT GUIDE.
- - LEFT GUIDE.
- - FRONT RANK MAN.
- - REAR RANK MAN.
- - BUGLER.
- - DRUMMER.
- - PACE.

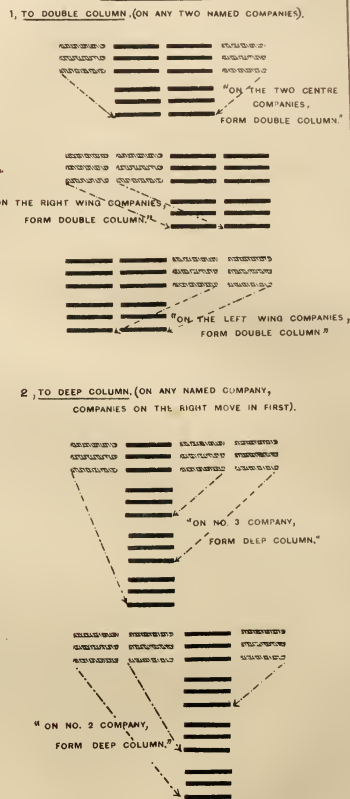
No. III.

THE BATTALION. CHANGES OF FORMATION.

FROM DEEP COLUMN,



FROM BROAD COLUMN

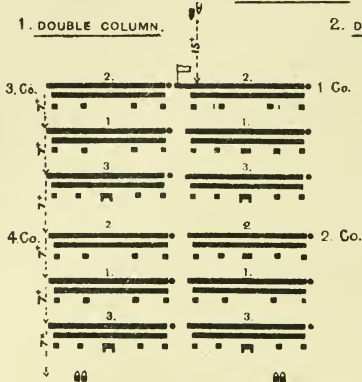


THESE CHANGES OF FORMATION ARE EXECUTED AT THE HALT AND ON THE MARCH THE COMPANIES MOVE INTO THEIR PLACES BY COMMAND OF THE COMPANY LEADER ON THE BATTALION COMMANDER'S WORD

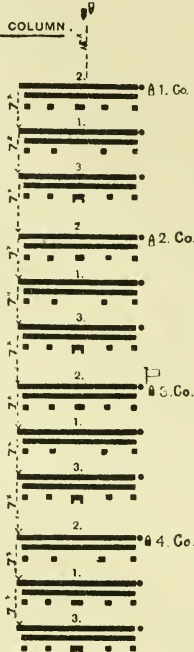
No. 11.

THE BATTALION.
NORMAL FORMATIONS.

1. DOUBLE COLUMN.



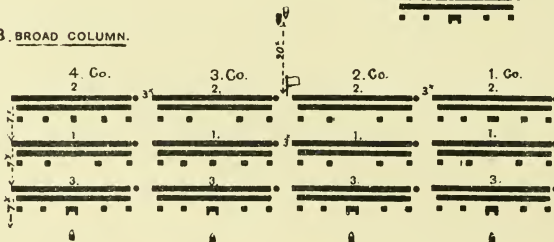
2. DEEP COLUMN.



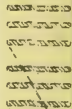
REFERENCE.

- - BATTALION COMMANDER.
- - COMPANY LEADER.
- - AIDE DE CAMP.
- - ZUG LEADER.
- - SUPERNUMERARY RANK.
- - BUGLERS AND DRUMMERS.

3. BROAD COLUMN.



1. TO DEEP COLUMN.



"RIGHT, FORM DEEP COLUMN

2. TO BROAD COLUMN



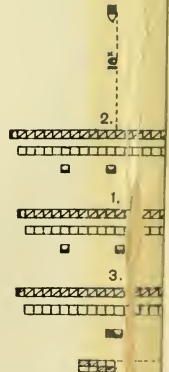
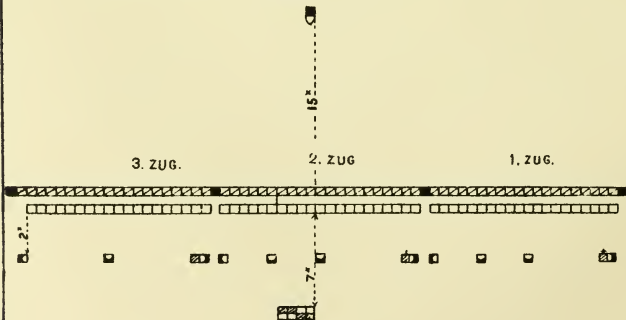
"RIGHT AND LEFT.
FORM BROAD COLUMN

"LEFT, FORM BROAD COLUMN

THE COMPANY.
NORMAL FORMATIONS.

2. COMPANY IN COMPANY

1. COMPANY IN LINE.



The Zug in Extended Formation.—(General Remarks.) “In training men for fighting or extended order, it is likewise not expedient to pass suddenly from individual instruction to that of the zug. Practices in files and groups should rather precede it. By them the soldier is first taught his functions as a unit in the fighting line, in which he has not only to respond to the leading of his group leader but also to consider the men on his right and left in his movements.

“Whereas a single soldier moving freely over the country will be able to find plenty of cover and is permitted to do so, the zug and still more the larger units, are only able to avail themselves of this advantage under certain circumstances, which it is the duty of the leaders to make the most of. Considerations regarding cover should on no account interfere with the uniform movement of the whole. For this reason alone the successive and connected movements of fighting lines form a very important subject in the training.

“The difficulty of execution increases with the extension and density of the line. At the commencement these exercises should be carried out with shorter lines at greater intervals of extension.”

Movements in extended formation are performed, as a rule, at the ordinary pace—only exceptionally at the double. In the advance by rushes, the space covered each time should rarely exceed 80 m. (87 yards).

The movements of a zug in extended formation are :—

1st. Advance and retirement of the zug or portion of it.

2nd. Moving to a flank by the diagonal march.

3rd. Change of direction by the indication of a new point to march on.

Movements to a flank, in file, should be avoided. A rigid adherence to dressing and intervals should not be required.

“The men are to be distinctly instructed to close up or open out for the purpose of availing themselves of cover.”

“The only thing to be considered with regard to dressing is, that the several portions of the fighting line do not interfere with one another in their movements and fire.”—(Part II, 26, 27.)

The extension may be at the halt or on the move. When extending, the rear rank men move up on the right of their front rank men. The interval of extension, unless specially ordered otherwise by the zug leader, is from one to two paces. Units in extended order march by their centre.

An extension, during a movement to the rear, is performed at the halt and facing the enemy.

Each group is commanded by a non-commissioned officer. The zug and group leaders place themselves in front of their respective charges, and, if possible, one or more non-commissioned officers are kept in rear of each zug, to superintend its movements.

Fire is only opened by a fighting line, when in position. It is only in exceptional cases that firing is allowed on the move. The instructions as to fire action, fire leading, fire discipline, the different kinds

of fire, and the observation of fire effect, are all extracts from the Musketry Regulations.

Sights should be adjusted with the greatest care during all practices.

The extended zug, when closed, forms up in line. If the zug leader continues to advance, the closing is carried out on the move.

The change of front of extended lines, by wheeling or on files, is abolished, and a change of direction is effected by indicating a fresh point of direction. The relieving of a fighting line is no longer provided for.

PART I.—C. *The Company.*

Instead of 37 pages in the superseded Regulations, the Instructions on Company Drill and Fighting only take up $17\frac{1}{2}$ pages in the new book. Its independence as a training and fighting unit has, however, been largely increased. The preface says, in para. 3: "The mastering of the actual drill should be accomplished in the company." The simplification this drill has undergone, has been most thorough and practical.

The company is composed of three züge, and each zug into two half-züge. The züge and half-züge are numbered from the right of the company. A footnote states that it is advantageous if this subdivision of the company into züge, half-züge, and sections is adopted and maintained, for purposes of interior economy, and if the men of a company are as much as possible of the same size.

As to its capabilities, the "General Remarks" say (§ 143): "The company should be so thoroughly trained, that it may remain under the control of the company leader under all circumstances, and that by paying proper attention to his orders, it may be able to carry out even what it may not have practised previously." The two normal close formations of the company are given in Diagram No. 1. (See Plate.)

The distribution of the Officers to the züge, is left to the Company Commander. The movements of a company in close formation are of the simplest description, as will be seen by referring to Appendix 4.

The distance between züge in company column, and between companies in battalion column is always seven paces.¹ In half-zug column, the full distance of seven paces should be gained when moving outside the sphere of the enemy's fire. When required to reduce the depth of the column, it is reduced to four paces.

All changes of formation into and out of company column are executed "out of step."

The dressing is always by the right, unless otherwise ordered. When two züge are marching in line, the dressing is by the centre zug leader.

In dressing up or taking up an alignment, the points given are two zug leaders and the outer flank Officer.

Company Square.—This company square is formed at the halt. The leading zug is halted, the next zug wheels outwards and forms the

¹ Measured from front rank to front rank.

side faces, the 3rd Zug closes up and forms the rear face. It is the last vestige in European tactics of a formation, which the Germans consider so well calculated to delay and restrict the development of the highest fire action at the most critical moment, and to co-operate with the enemy's cavalry in its endeavour to provide a good target for its artillery.

The Regulations say: "Complete regularity in the formation of square is not to be required, but prompt readiness to open fire in any direction must be insisted on." This condition of promptness in forming square and opening fire is more easily attainable in this comparatively small unit, which, moreover, forms a relatively small target for guns.

The ordinary movements in square are provided for. The occasions on which the square may be used are laid down in para. 50, thus: "The adoption of the square formation can only be considered suitable, when required by special circumstances, such as when the troops have expended their ammunition; when they have been severely shaken by heavy losses during the fight; or when compelled to retreat over open ground, in the presence of threatening cavalry, superior in numbers. Infantry engaged with cavalry should bear in mind, in all other cases, that the latter are justified in counting it as an advantage gained, as soon as they succeed in compelling them to discontinue their movements and to assume formations which will interfere with the development of the most effective fire-action."

The firing of a company in close formation may be delivered in line, company column, and in square. Volleys are delivered by companies or by züge. The zug leaders place themselves in rear of their respective züge, and call out their numbers before ordering them to fire. A company column at the halt may close up, so as to fire four deep. In square, volleys should, as a rule, be used, the side of the square required to fire being named.

Bayonet Charge.—The instructions commence with these words: "Should the company be required to charge in close formation," as if to indicate the unlikelihood of such a proceeding. The company comes to the charge and breaks into the "Storm March." At a distance, dependent on the circumstance of each case, the company is ordered to double and cheer. The drums beat the "Storm March" (the fifes do not play). After securing the position, the leading züge make ready and wait for the command to open fire on the retreating foe. In an unsuccessful attack, the troops in close formation and the fighting line retire simultaneously, the former in the strictest order and "in step."

The Company in Extended Formation.—The training and movements of a fighting line are fully dealt with in the zug instruction. Those for the company are limited to (1) Extension, (2) Reinforcing, (3) Support, (4) Assembly, and that only briefly.

Unless otherwise ordered, entire züge move out on the command "extend." In company column the leading zug, in line any named zug. The remainder of the company forms the support in line or column, and does not move off until the fighting line has gained the requisite

distance. An interval of seven paces is maintained between züge in the fighting line.

The fighting line is reinforced by command of the company leader, either by the insertion of fresh züge into the line itself, or by prolonging it. In the former case, the zug ordered to reinforce extends at once, and makes direct for the interval between the züge or any existing space in the züge already extended. An intermixing of züge is here candidly acknowledged as unavoidable, and, as far as possible to mitigate this evil, it is directed that the company should be practised in assuming fresh subdivisions, the zug and group leaders dividing the line between them.

How different from the unbending spirit of the old Regulations! These say (page 68, § 39, Chap. VIII): "For the sake of preserving unity of command, in reinforcing and reducing the skirmishing line, the original züge and sections should not, where possible, be separated, they should not, in any case, however, be intermixed." The same principle in other words is enforced on page 143, § 103, and page 187, second paragraph.

The Support.—"The portion of the company remaining in close formation serves for the extension of the fighting front, the support of the firing line and the protection of its flanks." These considerations regulate its position.

Its distance from the fighting line depends upon circumstances. No fixed rule can be given. The main consideration is the timely support of the fighting line.

For practices in which the nature of the ground is not taken into account, the distance should be about 150 paces.

The support, formed in column or line, marches without keeping step, and conforms to the movements of the fighting line. When under the enemy's effective fire, it marches "in step," and every change of formation is avoided. At the halt, the support lies or kneels down.

On the company leader's command to assemble, the züge, having rallied on the zug leaders, assemble in company column in rear of that portion of the company still in close formation. The company is to be practised to assemble in company column, line, and column of sections with silence and rapidity at any appointed place.

The principal alterations are shown in Appendices 2 and 3.

PART I.—D. *The Battalion.*

The 89 pages devoted to the battalion in the Regulations of 1876 are reduced to 10. This includes the instructions in Part II for procedure in action. This reduction is due to several causes: 1st. The individual instruction and that of the company are relegated to their proper place. 2nd. The relative position of the battalion in the chain of military units has been modified considerably. It is, of course, still one of the most important "units of command," but its character as a "fighting unit" has been changed. The former duties in action of the battalion as a whole, now devolve on the four companies of

which it is composed. Their actual handling when in the fighting line, is taken out of the hands of the Battalion Commander, and rests entirely with the company leaders. This is expressly stated in the last three lines of this section, page 82, § 219: "The direction of the fight in the extended fighting line, rests with the companies." The Battalion Commander's duties are very clearly defined, and he has ample scope given him to make his influence advantageously felt in action, without interfering with those who have actually to do the work.

The Preface says: "The battalion is the training school for the fight. The whole system of infantry fighting is based on the co-operation of the several companies with one another in the various phases of the fight:" and again, "Battalion drill, now only embraces close formations."

The Battalion Commander now tells his four company leaders *what* he requires to be done, giving them each their share of the task, but he refrains from telling them *how* to do it. In fact, if that were habitually necessary in any particular case, the Officer concerned would not long be allowed to remain in the German Army. These are the "General Remarks," § 197: "The battalion, composed of four-company columns must be able to execute the simple formations required in war on the command of the Battalion Commander, under all circumstances, with regularity and certainty."

The Battalion Commander delivers either both the cautionary and executive words of command or only the former. Cautionary and executive, when simultaneous execution by the companies formed up in either of the three normal battalion formations is required. In all other cases, the Battalion Commander delivers only the cautionary command.

The change from one formation to another is executed, as a rule, at "the slope." If not otherwise ordered, the companies at once "order," "Stand at ease," and take up their dressing on reaching their places.

On the drill ground, the movements in the normal formations and the change from the one to the other are executed in step. The deployment for the fight takes place either with or without keeping step at the Battalion Commander's discretion. All other company movements are executed out of step. When under the enemy's effective fire the marching is to be in step.

The natural consequence of the battalion having practically dropped its character as a unit in the fighting line, is that battalion drill has been completely revolutionized. Battalion fighting formations no longer exist. The formations of a battalion are simply close formations intended for the convenient assembling of large masses of troops. Appendix 5 contains a complete list of battalion movements.

Companies in battalion columns are invariably formed in company columns. The battalion is drawn up in mass or line of company columns according to the space available and the object in view. The order of the companies is immaterial. They move into column by command of the company leaders, by the shortest way.

Dressing and Covering.—At the halt, the dressing is by the right;

on the move, by the colour, in broad and double column; and by the right in deep column.

In broad and double column the "Points of formation" are the colour, the zug leaders of the leading units, and the left flank non-commissioned officers. In deep column, the zug leaders and the left flank non-commissioned officers.

In broad column, files must maintain their own covering; in double column, the zug leaders and left flank non-commissioned officers look to the covering. In deep column, the zug leaders cover.

Motions with the Rifle.—The motions with the rifle and loading are not practised when the companies are formed up in battalion columns, except when it becomes necessary for the sake of uniformity.

Deployment of the Battalion for Action.—The manner in which the companies enter into action may vary considerably. Generally the companies will be inserted into the fighting line as required, the remainder being kept in hand by the Battalion Commander. But circumstances may require the simultaneous deployment of all the companies from the very commencement. Such deployments to the front occupy the shortest time when performed at the halt. The order for the deployment should indicate the company of formation as well as the intervals and the relative positions of the several companies. As a rule greater depth than breadth will be given to the original deployment, the fighting line will be reinforced gradually, and at least one company will be retained in reserve.

The movements of a battalion when deployed for action are regulated by indicating a common point of direction. A company of direction should only be named, when there is no point of direction. A change of direction is effected, by indicating a fresh point to march on.

If a change of front is to be effected, the new front will be pointed out, and the companies wheel up independently into the required direction. The relative position of the companies is thereby changed. This may be regulated by further orders.

The companies are reassembled in battalion, as a rule, on the march, otherwise at the halt, in the shortest way, on a named company, in one of the normal formations suited to the occasion.

The adoption of fixed formations to meet given cases, is prohibited.

A complete list of the changes made in battalion drill is given in Appendices 2 and 3.

The principal formations, &c., laid aside are—

1. Battalion line and linear tactics.
2. Columns of various distances.
3. Battalion fighting formations.
4. Attack in close formation.
5. Battalion square.

PART I.—E. *The Regiment.*

The old Regulations contain no instructions for the regimental "unit of command." In the new Regulations, it is given its proper place, and takes up seven pages.

To quote the preface, "Regimental drill embraces merely formations of assembly," and "The uniform education necessary for undertaking the duties connected with the training and leading of troops is imparted in the regiment. Regimental exercises are a preparation for the duties of higher commands."

General Remarks.

A battalion should be able to perform all the regulation battalion movements with precision, not only when alone but also in combination with other battalions. This is attained, by practising the regular and prompt forming up from column of march, into assembly or fighting formation, as well as those movements which are carried out with larger units. It should, however, be borne in mind, that uniform movements in close formation but rarely occur in war, and only admit of uniform execution within the battalion. They should therefore be restricted to the simplest description.

The Regimental Commander only gives cautionary words of command or orders, on which the Battalion Commanders deliver the necessary commands.

Assembly Formations of the Regiment.—Battalions are as a rule formed up in one or more lines of double columns.

If the regiment is composed of three battalions, and is formed up in two lines, one battalion is placed in the centre of the interval, either in front or in rear of the two others. If composed of four battalions, the battalions in second line cover those of the first. In the normal formation, battalions are placed in numerical order in each line, but any order is admissible. The intervals are twenty and the distance thirty paces (clear space). Whenever required for any special object, the battalions, in any of the three normal column formations, may be drawn up in any manner desired.

Movements in Assembly Formation.—These consist of simple movements to the front and rear, wheels and marching to a flank, and will be executed in accordance with the instructions laid down for the battalion.

For the initial movements, a battalion of direction will be named. The leading züge of all companies abreast should retain their dressing; this is not required in the case of the succeeding züge.

When the movement is carried out "in step," each battalion keeps its own step.

Changes of front (not greater than one-eighth) are carried out on a named battalion, which after wheeling up, advances column depth and halts. The remainder move into position by the shortest way. If the regiment is formed in two lines, the first advances the depth of both lines after wheeling, and the remainder take post in the shortest way.

Deployment for Action of the Regiment.—The fundamental consideration in the deployment of a regiment for action is the retention of the deep formation. The manner of deploying may vary considerably.

The battalions retained in closed formations are placed in echelon

in rear of one or both flanks. The narrower the original front taken up, the further away from the flanks should the units in echelon be posted, for the purpose of commanding the whole extent of front required. The prolongation of the fighting front, is effected by means of fresh battalions. In the advance, the deployment is carried out on the leading and in retiring on the rear battalion. When the deployment takes place from column of march, the several battalions avail themselves of a suitable opportunity for closing up into column formation previous to deploying.

If the regiment is in assembly formation, the deployment may be carried out before advancing. In all cases the battalion on which the deployment is to be made must be named. When the deployment is made on the move, the battalions forming the rear lines halt so as to gain their proper distance and place.

The distances depend upon circumstances. The intervals between battalions in first line, depend upon the task imposed, the object to be attained, and the nature of the country. In the original deployment the intervals should be ordered. The deployments are carried out, in or out of step, by the shortest way.

The movements of the regiments when deployed, are directed by giving the several battalions points to march on. A new front can generally only be taken up, by the deployment of the units echeloned in rear, in the required direction. If necessary, the original first line forms up in echelon in rear of the new front.

A unit of direction should not be named; on the other hand, whenever expedient, troops should be ordered to keep up connection with the centre or a flank.

When on the move, the regiment is re-formed, as a rule, in the direction of march, otherwise on a given line, in the required formation, on a specified battalion, by the shortest way.

The deployment of the company column, rests with the battalions.

PART I.--F. *The Brigade.*

The fate of the battalion, has overtaken the brigade even to a greater degree. The preface states that "Brigade Drill embraces merely formations of Assembly" and "Brigade exercises, more particularly, are a preparation for the duties of higher commands." As a fighting unit it has been disestablished, and as a necessary consequence the space allotted to its drill and other instructions has shrunk down from 35 to 5½ pages. Nevertheless, the duties that are still left to it are of great importance, and can only be efficiently performed by an educated practical soldier.

The "General Remarks" state briefly that "The instructions for the regiment are applicable to the brigade. The cautionary commands of the Brigade Commander are passed on by the Regimental Commanders."

The brigade is formed up either in wings or lines. In wings the regiments formed in mass of battalions, are placed side by side. In

lines, the junior battalion is in front line when in the normal formation. But any other order is admissible.

When the several lines are composed of the same number of battalions, these cover each other, otherwise the battalions in second line are placed in rear of the intervals.

The distance between lines and the intervals, is the same as with the regiment.

The positions of single battalions and batteries attached to the brigade are specially indicated.

The movements of the brigade in assembly formations, are to be restricted to the simplest description, and correspond generally to those of the regiment.

The Deployment of a Brigade for Action.

The issue of instructions for the execution of independent tasks in action to the subordinate units of command (regiments and independent battalions) within its fighting front, forms the basis of the deployment of the brigade for action. The execution, however, depends upon circumstances.

If the Brigade Commander is able to indicate to the several regiments, simultaneously, points of direction situated close together, the circumstances are the most favourable and normal for the deployment.

If only one regiment has been originally deployed for action, the most suitable place for the deployment or assembly of the remaining units of command, is in echelon in rear of one or both flanks.

All the movements of the brigade should be regulated by giving points to the several units of command to march on. A brigade composed of two regiments only, may at once place one battalion in reserve.

Everything else is carried out in accordance with the instructions for the deployment of regiments for action.

The deployment of the battalion for action rests with the regiment.

So far we have dealt with the School. Now comes Part II, The Fight, three quarters of which, it must be remembered, deal, as has been already stated, with general principles.

The principles contained in this part, once branded by many, and still by some in the military world of Europe, as the fanciful notions of theorists, now bear the official endorsement of the most experienced, practical, and enlightened soldiers of the age.

To be fully appreciated, every word of Part II should be carefully read, marked, learnt, and inwardly digested. It is so concise as scarcely to admit of further condensation. Want of space, however, compels us to deal with it in a more or less summary fashion. Those who wish to study it fully, I would refer to the translation of it by Captain W. H. Sawyer, Royal Lancaster Regiment, Brigade-Major, 1st Infantry Brigade, Aldershot, and published by Messrs. Stanford f Cockspur Street. This translation I have most carefully compared

with the original, and I can bear my humble testimony to the closeness of the two. It is an excellent shillingsworth.

These instructions for guidance in training and in battle, qualify Officers and men for the intelligent and effective application in the field, of the lessons they have learnt in peace-time, by giving them sound principles to work on.

We must turn to para. 125 to ascertain the real scope of this part of the Regulations: "The more advanced practices with mixed units and even tactical exercises in which the presence of the various arms is supposed, produce tactical situations and call forth decisions which are far beyond the scope of these Regulations. They in no way exhaust tactical instruction, but confine themselves to dealing with fundamental rules. The troops will, however, be able, even in action, to cope with any possible task, if they have, by practice, mastered the rules contained in these Regulations."

Formations only Normal.—Part II refers to the formations laid down in Part I, thus (§ 1): "The thorough mastery of the simple formations laid down in Part I forms the basis for a careful and uniform training of infantry. This training would, however, fail in its main object, were it not to go hand-in-hand with an intelligent application of these formations to the requirements of war." § 4. "The normal formations should be given up without hesitation whenever the varying circumstances require it." § 5. "The formation selected should be such as would be ordered in war to ensure the highest fire action, and which would be permitted for the purpose of reducing the effect of the enemy's fire. Whenever these two conditions are fulfilled the practice is in conformity with the requirements of war." § 121. "It should be borne in mind that the formations and principles laid down only deal with the simplest cases, and, owing to change of circumstances, will frequently experience modification when applied in the presence of the enemy," and "adherence to certain formations should never be allowed to divert attention from essentials."

These few extracts show us clearly what careful precautions have been taken to prevent the action of the "executive" from being in any way hampered by the misdirected efforts of mischievous formalism.

Spheres of Action of Commanders.—The chance of a breakdown of the military machine in the strain of war and stress of battle, has been reduced to a minimum by a judicious subdivision of labour and responsibility amongst all ranks. The exact duties and spheres of action of each leader have been carefully defined. The subordinates are thus left alone to do their own work in the fighting line, whilst the higher commanders, relieved from minor details, are able to turn their minds to the larger problems of strategy, &c., a wrong solution of which cannot be compensated for by any amount of hard fighting. The following concluding paragraphs to the Brigade, Regimental, and Battalion Instructions in Part I are significant and of very considerable importance.

§ 229 { "The deployment of the battalions for action rests
F. Brigade. { in the hands of the regiment."

- § 225 { “The deployment of the company columns for action
E. Regiment. { rests with the battalion.”
§ 219 { “The direction of the fight in the fighting line rests
D. Battalion. { with the companies.”

They are very fully borne out by the following paragraphs of Part II:—

Commencing with the lowest ranks, we find the possibility of the private soldier having (§ 61) to assume the leadership of his comrades in action, after all his superiors are incapacitated, taken into consideration, and provided for by the special training he now receives. § 21. “It is the Officer’s duty to develop the judgment and self-reliance of the soldier;” and, “He should ever be ready to take rapid, well-considered, independent action.”

The Group Leader.—§ 56. “He assists the zug leader, and is responsible within his own sphere for the placing of the men, for the adjustment of the sights, the proper handling of the rifle, the consumption of ammunition, and the replenishing of the magazine.”

The Zug Leader.—§ 55. “He should take up such a position as will enable him to superintend the fire action of his men. He arranges the disposition of his zug in the space allotted to it, and decides on which objects the fire is to be directed, either in accordance with his instructions or on his own responsibility. He follows closely, the measures taken by the enemy and endeavours, according to his ability, to co-operate with the adjoining züge in the fighting line. He endeavours to ascertain, previous to a further advance, how the fighting line, or portions of it, could be brought up closer to the enemy; whether or in what manner a turning movement could be initiated; or whether advantage could be taken of any exposed point in the enemy’s line. The zug leader in the fighting line will be best able to observe any opportunity of seizing an advantageous position, or of gaining an advantage over the enemy. He should then make up his mind how far he should, on his own responsibility, turn such advantage to account.”

The Company Leader.—§ 95. “He should retain control of his company during the fight. He conveys his intentions to the zug leaders in the form of concise and clear orders, and takes up such a position as will enable him to direct his company. He arranges for the supply and distribution of the ammunition brought up from the rear, with all the means at his disposal on the battle-field.”

The Battalion Commander.—§ 96. “The method adopted by the Commander in working his battalion in action, is to assign tasks to the several companies. Direct interference with the züge of individual companies is only permitted when evident misunderstandings or mistakes threaten to divert the course of the action into improper directions. It is the duty of the Battalion Commander, at the commencement of the fight, to impart his orders briefly, clearly, and with precision to each one of the company leaders—if possible in the presence of them all—leaving the manner of execution to them. He should be guided by this principle throughout the course of the action. His endeavour should be to maintain the co-operation of the

several companies with one another during the fight." § 101. "It is with regard to the troops placed in rear of the fighting line, either in echelon or in rear of the centre, that the Battalion Commander selects his own position, which is only quite exceptionally in the foremost line, nearly always with the troops in rear, but in any case in some place whence he can exercise supervision over his battalion in action. He will frequently only be able to affect the fire action of the companies, by directing the fresh supplies of ammunition to those points in the fighting line, where it may be most needed."

The Regimental Commander.—§ 103. "He appoints separate tasks to the several battalions, leaving them perfect freedom as to the manner of execution. Interference with the conduct of individual companies should be restricted to rare exceptional cases, and is only justifiable when the action of subordinate bodies threatens seriously to interfere with the execution of the Commander's general intentions, and there is no time to issue the necessary orders through the proper channel." § 109. "For the due execution of the tasks imposed upon him, the Regimental Commander should take up a properly selected position. At the commencement this will be in front. His presence is principally required there in the case of an encounter between troops in motion. During the fight, he can generally direct his troops to the best advantage from the vicinity of the troops echeloned in rear, that is, whence he can exercise the best supervision over the employment of his regiment. Should his regiment be fighting in brigade, he should select such a position as will enable him to keep up communication with the Brigade Commander."

The Brigade Commander.—§ 112. "The rule should be adhered to under all circumstances, that each regiment is to be allotted its own separate task, and that the Brigade Commander should confine himself to delivering his orders to regiments only." § 114. "The selection of the Brigade Commander's position is of great importance and should be changed as rarely as possible. The commencement of an action should find him at the head of the brigade; for neither reports, nor information, nor maps can take the place of a personal inspection of the enemy's position, that of the neighbouring troops, or of the ground. In that position he is best able effectually to direct the initial deployment, on which the course of the action so greatly depends.

"It likewise enables him to seize advantages over the enemy, by arriving at timely decisions, to ensure his troops taking the shortest routes, to direct their action into proper channels, and finally to prevent any irregular action on the part of the Commander of the advanced troops. During the action, however, the Commander remains sufficiently in rear to enable him to exercise supervision over the several parts of his brigade. This will generally be in the vicinity of the troops he has retained at his disposal. It is only from there that he can still control the course of the fight. He delivers his orders, as a rule, to his immediate subordinates. Should circumstances compel him to deviate from this rule and to give in-

dividual battalions direct orders for the execution of urgent measures, he should at once inform the Regimental Commander of the fact with whom he should maintain uninterrupted communication."

The next two extracts are applicable to all Commanders alike, § 124. "The larger the scale of the fight, the greater the scope for individual action. The attention of Commanders should be devoted more to carrying out their special task as a whole, than to the supervision of details. . . . But the scope allowed subordinate leaders should never be permitted to interfere with the plans of the Commander, and under all circumstances the maintenance of tactical order and the internal cohesion of the troops should be insisted upon." § 54. "The exercise of independence within these limits is the foundation of great results in war."

Fire Action.—At page 148 of the old Regulations we find the old Regulation view of the value of fire action. "The possibility of concentrating fire action on particular points for a short time invests it with an offensive character. It *may* under certain circumstances be absolutely annihilating, and may consequently of itself produce a decisive result, in any case an attack following immediately after would thereby be greatly facilitated." How different is the position accorded to fire action in the new Regulations! Part II, § 13. "The infantry fight *will as a rule* be decided by fire action." § 30. "The action of infantry consists *primarily* of the fire of the extended fighting line. It is able, *solely* by its fire, not only to repel the enemy and prepare the attack, but also under certain circumstances to decide the issue."

The Germans now classify all formations under two heads: 1st, the fighting (or extended) formation, the only one possible under modern fire; and 2nd, close formation, the only way of concentrating large masses preparatory to assuming this fighting formation. Linear tactics are completely excluded, as having no place in modern tactics. They are impossible in the first and useless in the second formation. Battalion, regimental, and brigade formations all come under the second head. The company is the only unit with a *close* as well as an *extended* formation. As to the proper rôle of close formation on the modern European battle-field, the *old Regulations* say, page 147: "The bodies in close formation should lay the greatest value on the retention of the troops in rank and file, the interior cohesion, the firing in mass and on the bayonet charge." *New Regulations*, § 13. "The delivery of fire by bodies in close order is the exception." § 18. "Fighting in extended formation and the correct application of its various movements, passing from extended to close order and *vice versa*, require therefore to be practised more thoroughly than the application of close formations, in which the infantry fight was formerly conducted, extended order then taking merely a secondary part." § 19. "The extended formation is the one now principally employed in action. The fight is commenced and in most cases carried through to the end in extended order. The extended line becomes, therefore, the principal fighting formation of infantry." § 20. "Close formation nevertheless still retains its full use in the

case of troops held in readiness for action and for reserves and supports to the fighting line."

The Three Arms.—The new Regulations speak with no uncertain sound as to the action of infantry against the three arms.

The proper application of fire action, in all and every case, is the burthen of its teaching.

Infantry.—§ 47. "In the case of infantry *v.* infantry, the result depends, apart from moral factors, on the musketry training, fire discipline, and the direction of the firing. The Commander's task is to bring as many rifles as possible into action, or to gain the upper hand by concentrating the fire effect of extended lines on decisive points."

Cavalry.—§ 48. "The individual infantry soldier should realize the fact that he is more than a match for a cavalry soldier even on open and level ground, if on encountering him he is in immediate readiness to open fire. He need not even hesitate to engage several at a time, if he retains his calmness and presence of mind and uses his rifle correctly as a repeater without taking his eye off his opponent. Infantry should remain convinced that it has nothing to fear from cavalry, even in superior numbers, if it retains its coolness and firmness. Every formation is suitable for repelling cavalry, which admits of its being opposed by the well-aimed fire of masses at the halt. The most effectual manner of receiving cavalry is to bring the greatest available number of rifles to bear upon it. Only those formations (*i.e.*, changes of front) which favour this need be executed against cavalry."

Artillery.—§ 51. "In engaging artillery, it should be remembered that to this arm belongs superiority of fire at long and medium ranges. It is only at 1,000 mètres (1,094 yards) that the relative conditions become equalized, and at the shortest ranges the infantry gains the superiority. Infantry should endeavour to get as close as possible to artillery, by availing itself of the formation of the ground. Infantry fire should first be directed on any teams that may be visible and then on the gunners." Long-range fire is discountenanced as a rule.

Intrenching Tools.—§ 52. "Artificial cover prepared at the right time and place renders the troops and their leaders services, which are important and at times indispensable. It should, however, be subservient to the leader's plans, and should in no way govern them."

"The premature strengthening of ground is positively detrimental and restricts freedom of movement. Tactical training is required on the part of Commanders, in order to know when and where, as well as how to intrench."

Extent of Fighting Front.—With regard to the extent of "fighting front" taken up by infantry on a peace footing, it is interesting to notice how the Germans have solved the point in their own practical manner. § 25. "Even during tactical manœuvres, a normal front of 100 mètres (the approximate fighting front of a war-strength company) should be allowed for a company in extended order. This extension, as compared with the strength of a company, is greater

than that adopted in war. This, however, is equalized by the fact that the fighting line is not thinned by casualties as in war."

So much, then, for Part II. Little need be said of the last, the third, Part—Parades, &c.—in which are, however, many points of interest, showing, as they do, how complete is the reform throughout. It will suffice to say, that complicated show movements and formations for the edification of spectators, requiring much time and trouble in getting up, exist no more. 12½ pages contain all the necessary instruction for the smart and soldierlike performance of all parade duties.

Bugle Calls.—The bugle calls have likewise been most carefully revised. They numbered twenty-nine. Of these, thirteen have been abolished, and five others have been introduced. These are shown in Appendices 2 and 3.

Those abolished include all those, by means of which the Battalion Commander was wont to handle the skirmishing line, which duty has now been removed from his hands to those of the company leader.

During exercises, the Commander may use calls to break off the fight, to continue the fight, or to assemble the Commanders or their Aides-de-Camp.

In action, the only bugle calls allowed are—

Rapidly forward,
Fix bayonets,
Attention.

Of the drum and fife calls, three have been abolished and one introduced, leaving a total of twelve.

Common sense, combined with a sound military training, will find a free hand left it in every part of these Regulations. There are, however, four things, and only four, distinctly prohibited.

Part I, § 104.—Leaders are forbidden to use preconcerted signals with the whistle.

Part I, § 219.—The laying down of fixed formations for the deployment for action, to meet special cases, is forbidden.

Part II, § 82.—Any further systematizing of the procedure of attack is prohibited.

Part II, § 120.—Practising particular representations of the fight is prohibited.

These prohibitory clauses are doubtless inserted with a view to guarding against the stiffening effect of time, and effectually to prevent the letter from ever gaining the ascendancy over the spirit, in the application of these Regulations.

And now in conclusion let me give you *literatim* and *verbatim* the last "note" of the friend to whom you are—as I am sure you must feel yourselves to be—under a great obligation for the information he has enabled me to put before you. That "note" runs as follows, and how far you concur in the sentiments it so eloquently and concisely expresses, the discussion which I hope will now take place, will show.

"A careful consideration of the German Drill Regulations, 1888, cannot fail to convince us that the Germans have indeed cleared their deck for action and thrown all useless lumber overboard! Nothing has been retained but what will be of use in, and stand the test of war. All the cherished, truly national and traditional rigid linear tactics and spirit, inherited from their great King Frederick, for ever relegated to History! Simplicity and uniformity introduced into their drill and training, all non-essentials eliminated, enabling increased time and attention to be devoted to essentials, and thereby facilitating and expediting the re-incorporation of the Reserves in time of need; constant and immediate readiness for war at all periods of the training. Such are the principal advantages secured.

"Great as has been this wave of military reform, we may rest assured that now letter and form have been effectually subjugated by the spirit, wave after wave will succeed it in proper time, continually readjusting the military fighting machine and fitting it for the performance of its ever-changing work."

If this be correct, as I personally believe it to be, the lesson before us English soldiers is, in all departments and branches of our profession, to "go and do likewise."

APPENDICES.

No. 1. Comparative Table of Contents of Drill Regulations, 1876 and 1888.
No. 2. Obsolete Movements, &c.
No. 3. New Formations, &c.
No. 4. The Company.
Normal Formations.
List of Zug and Company Movements.
No. 5. The Battalion.
Normal Formations.
List of Battalion Movements.
No. 6. Organization. War and Peace Establishment.

APPENDIX I.

German Infantry Drill Regulations, 1876.

Total 226 pages.

Chapter.	Pages.
1. Instruction without the rifle.	35
2. Instruction with the rifle.	
3. Motions with the rifle for N.C.O's. Carrying the colours and the sword, and salutes with the same for Officers.	
4. The squad.	37
5. Formation, telling off, and dressing of a company.	
6. Motions with the rifle and company firing.	
7. Movements of a company.	
8. The company column and fighting in extended formation.	
9. Formations for special objects.	

Part I.
Individual
Instruction.

Part II.
Squad and
Company.

APPENDIX I.

German Infantry Drill Regulations, 1888.

Total 169 pages.

Preface	No. of pages.
	3
A. <i>Individual Instruction.</i>	31
Without the rifle.	
With the rifle	
Fighting in extended order	
B. <i>The Zug.</i>	22½
Close formation	
Extended formation	
C. <i>The Company.</i>	13½
Close formation	
Extended formation	
D. <i>The Battalion</i>	7
E. <i>The Regiment</i>	4
F. <i>The Brigade</i>	2

Part I.
The School.

Number of pages.

Pages.

Chapter.

Part III. The Battalion.	10. Formation in three ranks; dressing motions with the rifle; firing and movements of a battalion from line. 11. Formation of column. 12. Movements in column. 13. Formation of line from column. 14. Formation in two ranks (fighting formation). 15. The square. 16. The assembly.	61
Part IV. The Battalion in action, with special reference to fighting in extended for- mation and the use of company columns.	17. Individual and squad instruction in extended fighting formation. The duties of Officers and N.C.O's. 18. The battalion in action. The use of skirmishers and company columns in general.	28
Part V. The Brigade.	19. Assembly and deployment. 20. Movements of a deployed brigade. 21. Parade and march past. 22. Taking out and replacing the colours. 23. Bugle calls, marches, and sundry calls for drums and fifes.	35 32
Appendix No. 1.	Bugle calls	29
" "	Marches for drums and fifes.....	12
" "	Sundry calls for drums and fifes ..	14

Part II. The Fight.	A. General Principles	36
	B. The several units in action —	
	The Company.....	4
	The Battalion.....	3
	The Regiment	13½
	The Brigade	3½
	C. Concluding Remarks	3

Part III. Parades, &c.	A. The Parade	12½
	B. Taking out and replacing the colours.	2½
	C. Bugle calls	1½
	D. Brass and reed bands	11

Appendix No. 1.	Bugle calls	21
" "	Marches for drums and fifes	12
" "	Sundry calls for drums and fifes .	12

APPENDIX II.—*Obsolete.**a. Individual Instruction.*

1. "Schliessen." Closing to flank by side step as a practice. Incidentally mentioned § 11.
2. Manual exercise.

{	Advance arms.
{	Support "
{	Shoulder " (rifle and colour).
{	Slope from the advance.
{	Advance from the slope.
{	Inspecting arms.

Note.—Only the order, present and slope are retained.

3. All exercises "by numbers."

b. Company.

1. The "three-rank formation."
2. Subdivision of company into two züge.
3. Open and close columns.
4. Wheeling of extended fighting line.
5. Relieving of extended fighting line.

c. Battalion.

1. Battalion line and line movements.
2. Battalion columns at different distances.
3. Battalion fighting formations.
4. Attacks in column and line supported by skirmishers.
5. Battalion square.

d. Bugle Calls.

- | | | |
|---|--|--|
| <ol style="list-style-type: none"> 1. Advance and rear guard. 2. Supports. 3. Skirmish. 4. Cease fire. 5. Half right. 6. Half left. 7. Left wheel. | \| | <ol style="list-style-type: none"> 8. Right wheel. 9. Forward. 10. Unfix bayonets. 11. Rapid retire. 12. Slow retire. 13. Form column. |
|---|--|--|

Drums and Fifes.

1. Rapid firing.
2. Cease firing.
3. Reveillé.

APPENDIX III.—*New.**Individual Instruction.*

1. "Strecken." { Salute by a sentry at the order. The rifle is grasped by the muzzle, and the arm extended to the right, the butt resting on the ground.

2. During the bayonet charge, the rifle is now held at the short trail instead of the trail.
3. The ordinary pace has been accelerated from 112 to 114 paces a minute.
At the double the pace is now given as 165—170 a minute, measuring 1 metre (39·3 in.).
4. In marching “out of step” (*ohne tritt*) the distance between ranks from back to breast is increased from 0·64 to 0·80 in. (25 to 31½ in.).

Company.

1. The two-rank formation.
2. The subdivision of the company into three züge.
3. The company wheel, always executed at the double and out of step.
4. All interior movements of the company executed out of step.
5. Normal column distances of seven paces.
6. The company leader is mounted, when the company forms part of a larger unit.
7. The handling of the company in the fighting line rests solely with the company leader.

Battalion.

Normal Formations.	{	1. Double column.
		2. Deep ,,
		3. Broad ,,

Bugle Calls.

1. 4th Battalion.
2. Commander's call.
3. Aide-de-camps' call (orders).
4. Rouse.
5. Retreat.

Drums and Fifes.

1. Rouse.

APPENDIX IV.—*The Company.*

Normal Formations.

1. Company column { seven paces from front rank
to front rank.
2. Line.

Movements.

a. Zug—

1. Marching in line { advancing.
retiring.
diagonal march.
2. Wheeling in line.
3. From line into { file column
section column } and back.
4. Changing from one column into another.
5. Column changing direction.

b. Company—

1. Marching in line $\left\{ \begin{array}{l} \text{advancing} \\ \text{retiring.} \\ \text{diagonal march.} \\ \text{wheeling (at the double and out of step).} \end{array} \right.$
2. From line into $\left\{ \begin{array}{l} \text{file column} \\ \text{section column} \\ \text{company column} \end{array} \right\}$ and back.
3. From company column into $\left\{ \begin{array}{l} \text{file column} \\ \text{section column} \end{array} \right\}$ and back.
4. Company column movements $\left\{ \begin{array}{l} \text{advance and retire.} \\ \text{to a flank in } \left\{ \begin{array}{l} \text{file} \\ \text{sections} \end{array} \right\} \text{ and back.} \\ \text{change of direction.} \\ \text{wheel.} \end{array} \right.$
5. Company column, reducing its front by half-züge and back.
6. Square. (Movements in square.)
7. Bayonet charge.

APPENDIX V.—*The Battalion.**Normal Formations.*

Companies in battalion columns are invariably formed in company columns.

1. Double column .. $\left\{ \begin{array}{l} 1. \text{ For purposes of assembly and} \\ 2. \text{ For movements outside the sphere of the enemy's fire.} \end{array} \right.$
2. Deep column ... $\left\{ \begin{array}{l} 1. \text{ For purposes of assembly, when a narrow front is} \\ \text{required.} \\ 2. \text{ When a march is to be commenced from the place of} \\ \text{assembly.} \end{array} \right.$
3. Broad column .. $\left\{ \begin{array}{l} 1. \text{ For parade purposes.} \\ 2. \text{ Only to be used when broad front is required.} \\ 3. \text{ Not suitable for battalion change of front.} \\ 4. \text{ For reassembling after an action.} \end{array} \right.$

Movements.

1. Changes from one column into another—

From double column into $\left\{ \begin{array}{l} \text{Deep column.} \\ \text{Broad column.} \end{array} \right.$

From deep column into $\left\{ \begin{array}{l} \text{Double column.} \\ \text{Broad column.} \end{array} \right.$

From broad column into $\left\{ \begin{array}{l} \text{Double column.} \\ \text{Deep column.} \end{array} \right.$

2. Movements in column:—

Changes of direction by $\left\{ \begin{array}{l} a. \left\{ \begin{array}{l} \text{wheeling} \\ \text{diagonal march} \end{array} \right\} \text{ by word of} \\ \text{command.} \\ b. \text{ Indication of point to march on.} \\ c. \text{ Wheeling up by sections.} \\ d. \text{ Wheeling in } \left\{ \begin{array}{l} \text{double column.} \\ \text{deep column.} \\ \text{broad column.} \end{array} \right. \end{array} \right.$

APPENDIX VI.

Strength of German Units (Combatants).

Unit.	Peace strength.				War strength.		
	Officers.	N.C.O.	Buglers and Drummers.	Privates.	Officers.	N.C.O.	Buglers and Drummers. Privates.
Company	4	27	4	110	5	44	4
Battalion	18	566			22	1,002	
Regiments { 3 Battalions	58	1,769			68	3,017	
Brigade.....	76	2,263			90	4,019	
	..	(Two or three regiments.)			138	6,037	

Colonel Sir LUMLEY GRAHAM, Bart. : Mr. Chairman and gentlemen, I wish to make a few remarks on the very interesting lecture which my friend Colonel Lonsdale Hale has given us. I understand from what he said that the substance of it was communicated to him by a friend to whom we must be very much indebted for the trouble he has taken. I would first of all remark that I think there has been some slight exaggeration by the writer of that paper with regard to some of the minor details of change, which do not matter much, perhaps, but still they are of some importance. For instance, any one who had heard that lecture without knowing anything about the tactics of the German Army would suppose that it was a new thing to form the company into three züge, but that is not so. Ever since I have known anything about the German Army, which is more than twenty years, and I do not know how long before that, the company was originally formed up on parade three deep and in three züge, but as soon as it was prepared to drill or manœuvre, by a complicated arrangement the third rank was done away with, and the two züge, of which it was originally composed (what we should call half companies), were divided into three züge. I gather that the three-deep formation has been done away with altogether; if so, I congratulate the German Army on the change. It always seemed to me a most extraordinary thing that practical soldiers like the Germans should retain their three-deep formation even for parade, entailing as it did the change into the two-deep formation before the company began to manœuvre. I am glad that they have done away with this complication, and I think we may reflect with some pleasure upon the fact that we in England who are not, as a rule, looked upon as leading the way in military matters should, at any rate, have been far before the Germans and others in this instance. A very long time ago, at the beginning of this century, we adopted the two-deep formation as a normal formation, and no doubt that led to the great development of fire which we used with such effect in the wars of that period, and which gave us great superiority over our enemies. There is another little detail which the writer of the article refers to in a manner which would lead me to suppose it was something new, but it is no novelty. I refer to the "marching without step," what we should call "marching at ease," which has always been practised in our Army and in that of Germany ever since I can remember, not, however, to the same extent by us as by the Germans. They call it marching without step. We used to, and I believe still, expect the men to keep step even when marching at ease; and indeed they generally do so of their own accord, because they find it pleasanter to keep step than not, but we allow all the other relaxations permitted by the Germans when marching without step; these are, however, trifles. The great point brought out by the lecturer is the spirit which inspires the changes now made in the field exercises of the German Army. The inspiration, by-the-bye, does not come from above, it comes from below, dating from the year 1866. During the war of that year, although the leaders of the Army adhered to a great many of the old rules, to which they were wedded, and were averse to changes, there were, nevertheless, enlightened spirits in the Prussian Army who saw that many of those rules were obsolete, and ever since 1866, down to the year 1889, there has been a constant conflict between the Reforming and Conservative parties in the Army, the former, as a rule, comprising the younger Officers, the latter, those of a higher degree. A great many of those changes which are now officially adopted in the Regulations of the German Army had been practically in use before. There is no doubt that the battle before Metz taught a great lesson, and proved the necessity of great tactical changes which had hitherto been resisted by the chiefs of the Prussian Army. The principles which thus recommended themselves were to a certain extent recognized by authority, and were carried out by the more enlightened Officers during the remainder of the war. From that time onwards there has been constant fretting on the part of the military reformers to work those changes, which have at last made their way, and which are now recognized and authorized by the present Regulations. But I do not think there is a single point mentioned by the lecturer amongst the more important changes in German tactics which had not been strongly advocated for years by one or other of their military writers. I think we may apply this lesson to ourselves. We have not had the same advantages as the German Army in having to fight against civilized troops, so that we have not

learned by experience how necessary many of the reforms were sometimes; and, moreover, what fighting our Army has had, and perhaps is likely to have for some time to come, has been against an enemy to whom the scientific methods of modern warfare are not always applicable. This is bad for us in some ways; it leads us rather to neglect the modern scientific mode of fighting and to adhere to our old forms, which under certain circumstances, against the sort of enemy that we encounter, are more advisable. Therefore I think it is most important that the attention of our soldiers should be frequently called to what is really the scientific mode of fighting, and the mode that we should have to practise if we ever engage against a European enemy. I think on that account the way in which Colonel Hale has summarized the authorized changes in the German Army is of very great importance, and I hope that those in command, the higher authorities of the Army in this country, will take notice of what has been done abroad by a nation which has had the best possible opportunity of judging of what is really useful in war, and that we shall not lag behind. At the same time, Officers who command our troops in action against Zulus or Soudanese, or any similar antagonists, will, doubtless, have the intelligence to modify the process which they should use against a civilized enemy to what is required for engaging savages.

Colonel LONSDALE HALE: There is a junior Officer present whom I may venture to call on, Lieutenant Ellison, of the Staff College, who has spent most of his vacation lately in Germany. I dare say he would be able to give us some practical information as to the working of these Regulations, and how they are accepted in the German Army.

Lieutenant G. F. ELLISON: General Erskine and gentlemen, the only thing which induces me to take a part in this discussion is the fact that since the introduction of the new Drill Regulations into the German Army, I have had opportunities during a recent visit to Germany of hearing German Officers discuss them, and also of seeing something of the training of the recruits under the new system. I may first of all state that the opinions which I have heard expressed by German regimental Officers have been entirely favourable to the new Regulations: they like them, and they say so. They thoroughly realize that the increased demands on the intelligence of the individual soldiers have by no means lightened their task in training them. Every company commander realizes too that increased responsibility is thrown on his shoulders, not only in having to train his men up to a higher standard of individual excellence, but also in the fight itself, as the company, as stated by the lecturer, has now practically taken the place of the battalion as a tactical unit. The German regimental Officer is accustomed to and welcomes responsibility. It has been remarked in England that the present Regulations with their broad general principles make great demands on the personal intelligence of the regimental Officers, but I think that any one who knows German Officers will feel convinced that they will fully justify such demands being made on them. Indeed, under a system where it is an absolute certainty that, unless they can satisfy such demands their services will be dispensed with, it cannot be otherwise. And I think it is just that responsibility which really was the main cause of the change, for, as Sir Lumley Graham said, these changes have been brought about by the lower ranks. The regimental Officers have a responsibility and they feel it, and it is they, to a great extent, who have called for the simplification of the drill. They are the men who really feel the evils of the old order of things, and having the responsibility, they were ready to say what they thought. It certainly is, to a great extent, the lower ranks of regimental Officers who called for, and have now got, these changes in the drill, because it is on them the responsibility falls. With regard to the training of the men, I should like to say a few words. The works on which the German company commander has to base the training of his recruits are: (1) Drill Regulations; (2) the Musketry Regulations; and (3) the Gymnastic Regulations. The German recruits join in November, and by the following March they have to be what we should call "trained soldiers," as far as these subjects, namely, Drill, Musketry, and Gymnastics, are concerned. Added to this is also the fact that under the new Regulations each recruit must be thoroughly grounded in the theory and practice of the soldier's duty in modern warfare, that is to say, in fighting in extended order. To attain so much in so short a time, a proper distri-

bution of time and daily tasks is one of the foremost problems for those on whom the responsibility falls, namely, the company commanders. That some Officers do find a difficulty in doing this is evidenced by the fact that there have appeared in Germany various short works published by Officers who have worked out a system for themselves; these works being for the use of their comrades who find a difficulty in bringing their men up to the given standard in the given time. To show what the aim of such books is, let me quote the words of one of these writers, Captain von Busse, a German Officer.¹ He says: "The task of those to whom the training is entrusted increases in proportion as more is expected of the individual soldier. They have to work on a material differing in its quality to no considerable extent from that of former days, when what was expected of it was substantially less." In speaking of the increased demands now made on the intelligence of the soldier, he is referring to what the Germans call the independent use of the rifle by the soldier in the fight, a term which one constantly sees in German books. He says that he has been induced to publish this work as "it cannot be otherwise than advantageous for the training staff to have at its disposal a definite plan on which the young Officer and non-commissioned officer can confidently continue to work without having to make experiments for themselves, experiments which are doubtful and not always accompanied by success." In conclusion, I would only point out what in the German system above all strikes an English regimental Officer. Those points are: (1.) The absolute and unqualified responsibility of the company commander for the training and discipline of his men and also in the fight. (2.) The marvellous intelligence brought out by theoretical instruction in the non-commissioned officers and men. (3.) The individual training, the *Einzelausbildung*, of the recruit. In all these works on the training of the men, that is the term which one so constantly sees employed. In musketry drill, and everything else, the recruit is first of all trained individually and singly. And (4) the complete concentration of the training, that is under the new Regulations, on the objects of the fight, on that end for which the soldier exists, namely war.

General Sir ARTHUR HERBERT: Generally I approve of the system which has been so carefully explained by the lecturer, but before we follow the plan adopted by the Germans, the organization of our battalions must be changed. If the companies are to become quasi-independent units, the number of companies in the battalion must be reduced. This has for years past been advocated by many Officers, but the change has been seriously objected to by many others. If the company is to become a tactical unit, and if the Captains are to have the great individual responsibility given by the German Regulations, the strength of each company must be considerably increased. The Battalion Commander could not equally well give the necessary instructions relative to the mode in which the attack was to be conducted to eight company leaders as to four. If he did, greater confusion would result, as there would naturally be a greater difference of opinion as to the manner in which the instructions should be carried out by the Captains if there were eight than if there were four leaders in each battalion. Therefore, so long as the present organization continues it would be very unadvisable to go as far as the Germans have in delegating authority to company leaders. Let anyone carefully read our new drill book, and he will find that a great quantity of the so-called top hamper has been thrown overboard, and that a long step has been taken in the right direction. For the present it appears to me we have gone far enough, and I hope we may move on gently. The Germans advanced very slowly in their reforms; twenty years have elapsed since the agitation for changes in the drill commenced, and they have only recently been officially approved of. I entirely agree that it is impossible to lay down any regulations which could be carried out in action and which would prevent companies and even battalions becoming mixed together when attacking in extended order. What is required is to accustom both Officers and men to work when mixed with other companies, and when an opportunity occurs to rally and re-form on their own Officers. This I and other Officers have endeavoured to do. When I commanded the camps of instruction at the Curragh, I made a point of mixing up the companies and even battalions in attack formations; both Officers and

¹ See *ante*, p. 572.

men soon became accustomed to move and manœuvre even when intermingled with other companies, and when opportunities occurred to rally on their Officers and get into order. It will therefore be seen that we also have tried many manœuvres before they have been officially adopted. It appears to me a mistake in the German drill, even in company formations, to adhere to the *touch*—on rough ground the touch cannot be maintained, and as battles are not fought on parade-grounds, what cannot be carried out on service should not be practised in time of peace. So long, therefore, as our battalion remains the tactical unit it would not in my opinion be desirable to delegate to company Commanders the powers and responsibility confided to them by the German Regulations.

General Sir LINTORN SIMMONS, G.C.B. : There is very little I can say in addition to what has been said. The lecture is one of extreme interest and one which must be beneficial in inducing Officers to study the system in vogue in Germany. I quite agree with Sir Arthur Herbert in what he has said as to the present constitution of the battalion ; years ago in this theatre a lecture was read at which I think I presided, or at any rate was present, in which the question was discussed as to the formation of the battalion, and I felt convinced at that time as I do now that the best constitution of a battalion for manœuvring in the field is one in which it would be divided into four companies. It has many advantages in other respects. I believe if properly carried into effect it would simplify the system of promotion, as I stated before Lord Penzance's Commission, by establishing a better proportion between the number of Majors and Officers of inferior rank. It has this great advantage in the field, that when the lines of skirmishers are extended, their support depends upon the Officers commanding the companies, the men of which are in the most advanced line, and thus men who are accustomed to work together and belong to the same company, get mixed up in the first instance in the fighting line, not as strangers ; I believe it would be of very great advantage that the supports should be formed from the company which furnishes the fighting line. I do not know that I have any further observations to make except that having been at the German manœuvres five or six years ago I was very much struck by the facilities afforded by their system of command, by which the details of attack are left to subordinates for changing the direction of the movements of very large bodies of troops, and transferring them from one part of the field to another, thus illustrating the advantages of their organization for the transmission of orders, an important but by no means easy object to attain when in action.

Colonel LONSDALE HALE : First of all with regard to the question of large companies ; I remember about eight or ten years ago discussing the subject with a distinguished Officer, who asked me not to go in for four companies, because he said if once you take four companies you will have the British taxpayer reducing your Captains by one half, and it is important that we should keep as many Officers as possible. It is perfectly certain that if you publish to the world that you will only have four companies, the next radical movement in the House of Commons will lead to a reduction of Officers. I greatly agree in what Sir Arthur Herbert has said, but I have never advocated it because I believe the loss of Officers would be a very serious thing. With regard to the lecture which I have been proxy for to-day, while most cordially agreeing with it, I think I ought to remind you the system which it describes is purely an ideal and untried system. It is not like the system which many of us described after the war of 1870, which had been proved by the results. We have to wait for a campaign to see how this extreme individualism and excessive subdivision of command will work. We have never seen anything tried in war like the ideal, and may I say the somewhat Utopian system which has been put before us in this lecture. My friend who was unable to give this lecture is, I think, a great believer in general principles. He has, however, never taught, and I have taught all my life, and I can only say this, it is easy enough to make men get hold of a certain amount of rule of thumb and to apply it, but give me a man who can grasp principles, especially young men between twenty and thirty, and can apply them properly, and you give me a man of more than ordinary ability. There is nothing so difficult as for young fellows to learn to apply principles to practice. From great experience in examinations I may say that if I want to stop Captains' promotion or Lieutenants' promotion, I merely have to give applied questions on

general principles only, and few will answer. If I combine the two, everybody answers the rule of thumb question, and only the best men, and they are few, answer the applied general principles. In order to apply general principles you must have a great amount of practice. In the German Army they are always practising and therefore they can be constantly trying to apply these principles to practice and be corrected by their older soldiers. In an army like our own which has no opportunity of practising in the field, to throw anything like this at their heads and say, "Here are principles for you, you must go to principles," I am afraid would lead to disaster. We must not give up altogether rule of thumb as well as the inculcation of general principles. It is usual to give a vote of thanks to the lecturer, but I have General Erskine's permission to alter the custom on the present occasion. I will therefore ask if I may be allowed to convey the thanks of this meeting to my friend who has furnished the material for this lecture.

The CHAIRMAN: Gentlemen, Colonel Hale in the first part of the paper to which you have been listening stated that it was the intention of the Council of this Institution to have a paper included in the programme relative to the recent changes which had been authorized in the Drill Regulations of the German Army, but some unfortunate difficulties occurred, and Colonel Hale very kindly undertook to get us out of them, and the present paper is the result of what he undertook to do. You will observe that in the paper he describes himself as simply the mechanism of the telephone. Well, I think he must find himself in a very novel position if that is the case, because any person more unlike a piece of mechanism in this world I cannot imagine than Colonel Hale. As far as my observation goes whenever he appears in this theatre he gives us the result of the working of the very fertile brain with which Nature has endowed him. I am quite sure it would be much more consonant to his feelings to come here and give us an original paper of his own than one of another person, and I hope before long that he will find an opportunity of doing that. With regard to the concluding parts of his lecture, wherein he points to the German Army as an example to ours, and calls upon us to follow their example, I have only this to say, that it seems very good advice. I should strongly advocate it myself, but at the same time we should not proceed to act upon it without great circumspection, for we must recollect that what may work very well in the German Army might not be at all suitable to ours. With this reservation I think his advice is very reasonable, and I think it must be a satisfaction to him, as I am sure it is to myself and to most of us, to find that our War Office has anticipated that advice in the manual of drill which they have recently put forward. Whether in the compilation of that manual the work of excision has been carried to the full extent that was required, I am not quite prepared to say. Personally, I should have liked to see a few more things eliminated from the old book, but at all events the new book is a great advance on what we have been accustomed to. I quite agree with Sir Lumley Graham that the reform which has taken place in the German Army has worked from the lower ranks up to the higher ones, and what holds good with them I am quite sure holds good in our own Army. I will not detain you further. We have already thanked the unknown gentleman who has helped Colonel Hale in this lecture, and we ought not to omit to thank Colonel Hale himself for coming here and giving us the benefit of it.

NOTE.—I think Sir L. Graham misunderstood my reference to the *zug*. The *zug* has assuredly existed for years, but its training as a unit appears in the exercise for the first time now. The marching "*Ohne Tritt*" is not that also of former days.—L. A. H.

Friday, April 5, 1889.

COLONEL C. B. BRACKENBURY, R.A., Director, Artillery College,
Woolwich, in the Chair.

RECENT INVENTIONS IN GUNPOWDER AND OTHER EXPLOSIVES.

By W. H. DEERING, F.C.S., F.I.C., Chief Assistant Chemist, War
Department.

THIS paper will be principally devoted to gunpowder, the part of my subject likely to have the greater interest for the members of this Institution. I must ask for your indulgence in respect of the deficiencies of the paper—deficiencies arising from pressure of time in putting the materials together, and also from necessary reticences concerning some of the subjects mentioned.

A natural classification of the changes which gunpowder has undergone would be:—Changes in chemical composition, changes in physical condition (in form, size, density), and changes both in chemical composition and physical condition; but there would be some inconvenience in adhering strictly to such a classification, and the limitations to which I have referred will necessarily make the review too imperfect to permit of such treatment.

I will mention first *Brown (or Cocoa) Powder*; although it is not a very recent invention it is desirable to consider it, as it gives continuity to this paper and the last read here on a similar subject: Colonel Brackenbury having mentioned it in his paper on "Gunpowder considered as the Spirit of Artillery," in February 1884, in the earlier days of its use.

It was introduced in 1882 in Germany, in the well-known form of a hexagonal prism with central cylindrical hole. Its composition (per 100 dry powder) of 79 per cent. potassium nitrate, 3 per cent. sulphur, and 18 per cent. of a very lightly-baked brown charcoal, is interesting on account of its wide deviation from the composition of the gunpowders then in use. The powders for military use in Europe were made with black charcoal, and generally were not very far removed from our own proportions of 75 per cent. nitre, 10 per cent. sulphur, 15 per cent. charcoal; the extremes of variation were shown by the French rifle-powder F₁, containing 77 per cent. nitre, 8 per cent. sulphur, 15 per cent. charcoal, and by the Dutch powder, stated to be composed of 70 per cent. nitre, 14 per cent. sulphur, 16 per cent. charcoal.

The use of very slightly carbonized straw for the brown charcoal, to be added to nitre and sulphur in the proportions already stated, was

patented by J. N. Heidemann (English patent, December 11, 1884, No. 16,314); and according to Major-General Wardell ("Handbook of Gunpowder and Gun-cotton") the brown charcoal used in Service Prism¹ Brown powder, is straw charcoal. Prism¹ Brown powder is used, as is well known, in the larger B.L. guns, and (for equal muzzle-velocity imparted to a projectile of the same weight) produces less pressure in the powder-chamber of the gun, and gives less smoke than the black gunpowder of the old composition.

Captain A. Noble and Sir Frederick Abel have estimated the quantity of heat, the volume of gases, and the chemical composition of the gases and of the saline residue of various typical gunpowders; and from their researches on "Fired Gunpowder" ("Proc. Roy. Soc.," 1880), and from the former's lecture on "Heat-Action of Explosives" ("Proc. Inst. Civ. Eng.," 1884), I have taken the following statement of composition of the saline residue and of the gases produced, under high pressure, on firing black pebble and brown prismatic powders in their steel explosion-vessel. The composition of gases and residue is of course not that prevailing at the period of highest temperature, but is that of the products after cooling down to atmospheric temperature. The water (pre-existing, or formed by the combustion of the charcoal) is not here included with the residues or gases.

The Powder.

Black Pebble.		Brown Prismatic.	
Nitre	74·76	Nitre	78·83
Sulphur....	10·07	Sulphur.....	2·04
Charcoal ...	14·22	Charcoal.....	17·80
		Water.....	1·33
			<hr/>
			100·0
Water	0·95		
	<hr/>		
	100·0		

The Residue.

Potassium carbonate (K_2CO_3)..	65·48	Potassium carbonate	64·12
„ sulphide (K_2S)	14·66	„ bicarbonate ($KHCO_3$)	13·55
Sulphur	9·49	„ sulphide.....	none
Potassium sulphate (K_2SO_4)...	9·96	„ sulphate.....	22·33
Other constituents.....	0·41		<hr/>
	<hr/>		100·0
	100·0		

The Gases (by volume).

	Vols.		Vols.
Carbonic acid (CO_2)	47·48	Carbonic acid	51·30
„ oxide (CO)	15·60	„ oxide.....	3·42
Sulphuretted hydrogen (H_2S) ..	2·70		
Hydrogen	3·28	Hydrogen	3·26
Marsh-gas (CH_4).....	0·31	Marsh-gas.....	0·31
Nitrogen.....	30·63	Nitrogen.....	41·71
	<hr/>		<hr/>
	100·0		100·0

Thus in the brown powder there is present more of the oxidizing nitre absolutely, and more relatively to the reducing charcoal and sulphur, than in the black powder. As a consequence, the residue of the brown powder is fully oxidized, and the gases contain only 7 volumes per cent. of unoxidized or imperfectly oxidized constituents (hydrogen, carbonic oxide, and marsh-gas); while the residue of the black powder contains some 24 per cent. of unoxidized constituents (potassium sulphide and sulphur, or rather potassium persulphide), and the gases 22 volumes per cent. I shall be able to show this difference of composition of the residues of the two powders by adding acetate of lead and acetic acid to some clear aqueous solution of the residues; in the case of the black powder black sulphide of lead is produced, in that of the brown powder white sulphate of lead.

The volume of permanent gases at the standard temperature and pressure (0° C. and 0.76 mètre), and the quantity of heat evolved on burning the black and brown powders, were found to be—

	Black pebble.	Brown prismatic.
On firing 1 kilogramme ¹ of dry powder—		
Volume of permanent gases produced (litres) . . .	278	198
Units of heat evolved (kilogramme-degrees Centigrade)	721	837

The number given for volume of permanent gases multiplied by the “gravimetric density” of a powder-charge will give volumes of such gases per one volume of powder-charge. In addition, however, to the permanent gases given above, the hot gases from the fired gunpowder will contain water-vapour: in considerable quantity in the case of the black powder, and in large quantity in the case of the brown; the greater part of the water being that produced by the oxidation of the hydrogen of the charcoal, when the latter is burnt by the nitre. Besides this, there is the one or two per cent. of water pre-existing in the powder.

I have calculated the volume of water-vapour which would be present in the hot gunpowder gases (in the gases, for instance, while exerting pressure in the powder-chamber and bore of a gun), taking the powder as used, and allowing for the hydrogen, free and combined, in the permanent gases. At standard temperature and pressure there would be produced on firing 1 kilogramme of powder as used (*i.e.*, not quite dry):—

¹ For purposes of calculation it may be convenient to have these values stated in cubic inches and pound-degrees Fahrenheit per 1 lb. avd. of powder; they are—

	Black pebble.	Brown prismatic.
Volume of permanent gases in <i>cubic inches</i> (at same temperature and pressure as above)	7694	5480
Units of heat (pound-degrees Fahrenheit)	1298	1507

	Black pebble.	Brown prismatic.
Volume (litres) of permanent gases	275·7	195·4
„ „ water-vapour	40·9	122·5
Total	316·6	317·9

Possible dissociation of some of the water-vapour at the period of highest temperature has not been considered; altered relations of some of the constituents at high temperature, by chemical reaction between water-vapour and carbonic oxide on the one hand, or between hydrogen and carbonic acid on the other, would not affect the volume of the gases, except indirectly through temperature.

There is difficulty in calculating the *temperature*¹ from the *quantity of heat* evolved by the explosion of gunpowder, on account of uncertainty as to the value to be adopted for the specific heat of the gases at high temperatures; but taking the influence of the water into account leads to some reduction of the difference between the calculated temperatures given by black and brown powder, the latter giving the higher temperature.

The volume of total gases produced being approximately equal, and their *temperature* being somewhat higher in the case of the brown powder, the lower pressure produced in the powder-chamber of a gun by the brown prismatic powder as compared with black prismatic of the old composition (of course, under comparable conditions, same muzzle-velocity imparted to projectile of same weight), must be attributed to the slower rate of production of the gases, *i.e.*, to the slower rate of burning of the brown powder; and this mainly due to its chemical composition.

The Mining Powder experimented with by Captain A. Noble and Sir Frederick Abel is interesting as an example of the influence of a change of composition in the opposite direction to that of brown prismatic powder. The mining powder used contained less nitre, more sulphur and charcoal than ordinary black gunpowder. The percentage composition was:—Nitre, 61·92; sulphur, 15·06; charcoal, 21·41; water, 1·61. The charcoal was a black charcoal of very nearly the same composition as that of the charcoal of the pebble powder. The products of combustion, solid and gaseous, are (as was to be expected) still richer in unoxidized or imperfectly oxidized constituents than the pebble powder. The volume of permanent gases (at 0° C. and 0·76 mètre) was found to be 360 litres (the volume of water-vapour to be added would be intermediate between that given above for black pebble and brown prismatic powders), and the quantity of heat to be 517 units (kgm.-degrees Cent.) per 1 kilogramme of dry powder. That is, much more gas and much less heat than from the black pebble,

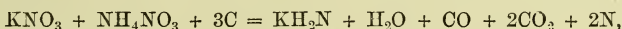
¹ Sir Frederick Abel and Capt. A. Noble estimate the actual temperature produced by the explosion of their black pebble powder at about 2100° C. (about 3800° F.), so that the volume of total gases (permanent gases and water) at this temperature (supposing that it were possible for work to be done without loss of heat by the gases in expanding) given by a charge of pebble powder of "gravimetric density" = 1, would be about $317 \times 8·7 = 2758$ volumes.

and *à fortiori* than from the brown powder. The estimated temperature given by the mining powder is also considerably lower than that of the others.

In speaking of the erosive action of fired gunpowder on the bore of guns, Captain Noble, in his previously-mentioned lecture, stated as the result of joint experiments by himself and Sir Frederick Abel on the erosive action of different gunpowders on steel tubes, that while erosion did not appear simply to depend on the temperature of the products of explosion, the gunpowder which caused least erosion was that which gave most gas and least heat.

In view of this statement, it would be interesting to know how a powder of the composition of this mining powder, in the form of prisms of the usual shape and size, would behave as a gunpowder: whether right ballistics and less erosion could be got with it.

Nitrate of Ammonium Gunpowder.—F. Gaens has proposed and patented (Eng. Pat. November 24th, 1885, No. 14,412) the use of a gunpowder differing from the old gunpowder still more radically in composition than brown powder does, and consisting of ordinary nitre, nitrate of ammonium, and charcoal. He calls it *Amide Powder*, and his theory is that when these components are employed in suitable proportions, potassamide, KH_2N (a compound of potassium, hydrogen, and nitrogen), is formed on ignition of the powder, that the potassamide is volatile at high temperatures and increases the useful effect of the explosive. He represents this by the chemical equation—

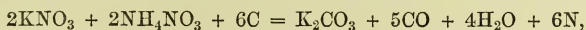


the two nitrates and the carbon of the charcoal giving the ordinary gunpowder gases: carbonic acid, carbonic oxide, water, nitrogen, and (so it is claimed) potassamide.

Mr. Gaens proposes the proportions 101 parts by weight of ordinary nitre, 80 parts nitrate of ammonium, and 40 parts charcoal; and he claims that such a gunpowder when burned leaves very little (if any) residue, produces no gases injurious to the gun, and much less smoke than ordinary gunpowder does.

The proposal is a very interesting one, and the advantages claimed are most important; but, as I have recently elsewhere pointed out ("Journal Soc. Arts," December 14th, 1888), there is no statement in chemical literature (so far as I have been able to ascertain) of the existence of a potassamide volatile as such.

Probably the main course of the chemical change would be—



the products being carbonate of potassium, carbonic oxide, water, nitrogen: familiar products of the explosion of ordinary gunpowder, the ammonia being oxidized into water and nitrogen; there would also be some inter-reaction between carbonic oxide and water-vapour at high temperature, with formation of some carbonic acid and hydrogen.

The volume of total gases produced by the ignition of such a powder would be very large, and its rate of burning would be likely to be

slow (from the absence of sulphur). Krupp's last Report, No. LXXIII, of October, 1888, contains an account of trials of new kinds of powder furnished by the United Rhenish-Westphalian Powder Factories. These were of two kinds, a large grain and a prismatic powder; their composition is not given, but from the properties attributed to them of giving but little residue, a thin smoke, and of being highly hygroscopic, it is very probable that they contain nitrate of ammonium, and are similar to Gaens's Amide Powder.

The grain powder, suited for use in guns of small calibre, was tried in guns of 4 to 8·7 centimètre calibre (1·58 inch to 3·42 inches), and found to give considerably less pressure in the powder-chamber for equal velocity than German Service grain and cubical powders tried in comparison: the new powder being stated to be about $1\frac{1}{4}$ to $1\frac{1}{3}$ times as efficient as the old.

The prismatic powder, suited for medium-sized guns, was proved in 10·5 and 15 centimètre guns (4·13 inch and 5·9 inch), with the result that the new powder was found to be more efficient per unit of weight than the older brown prismatic powder, giving less pressure for the same velocity; and it is stated that, without exceeding a safe limit of pressure, the new powder could give velocities which could not be reached by the brown prismatic powder.

The powder-pellet of the cartridge used in 1887 in the Swiss 7·5 millimètre Hebler rifle is stated to have had five-sixths of the potassium nitrate replaced by ammonium nitrate ("Mittheilungen über gegenstände des Artillerie und Geniewesens," 1888, p. 289). One would have thought that five-sixths potassium nitrate and one-sixth ammonium nitrate would have been more likely, but the statement is made as above.

E.X.E. Powder.—This, General Wardell informs us in his "Hand-book of Gunpowder, &c.," is a black (or rather slate-coloured) prismatic powder of usual prism¹ size, recently introduced for use in the 6-inch B.L. and in large R.M.L. guns. From particulars there mentioned, a charge of E.X.E. powder will impart the same muzzle-velocity to the 100-lb. projectile of a 6-inch B.L. gun as one of prism¹ brown powder weighing about one-seventh more; the E.X.E. giving about 1 ton per square inch more pressure in the powder-chamber of the gun than the brown powder.

S.B.C. powder, or slow-burning cocoa powder, is (we learn from the same source) a brown prismatic powder of prism¹ size for use in the largest B.L. guns, the $13\frac{1}{2}$ and $16\frac{1}{4}$ inch; and from details there given, this powder, proved in an 11-inch B.L. gun, gives (for a slightly greater muzzle-velocity to a projectile of same weight) about 2 tons per square inch less pressure in the powder-chamber than does the old "prism¹ brown" powder. To give the same muzzle-velocity, a charge of S.B.C. about one-fifth greater than that of the "prism¹ brown" appears to be required.

Perforated Cake Powder.—As is well known, the perforated hexagonal prismatic powder was the result of General Rodman's views on the theory of the burning of gunpowder, and of the previous trial (in 1860) of his cake powder. This consisted of cylindrical cakes of

compressed powder in which cylindrical holes were made by pins in the operation of pressing. A cylindrical charge, of the diameter of the bore of the gun, was made of these cakes, the latter being placed so that the holes in the different cakes corresponded. In 1871 charges of this kind were made in the United States for the 12-inch and 10-inch Rodman guns. The charge for the former gun weighed 75 lbs., and was composed of four cylindrical cakes $11\frac{1}{2}$ inches in diameter and 3 inches in height. They were pressed as whole cakes, and $\frac{1}{4}$ -inch cylindrical holes (with their centres at $\frac{3}{4}$ -inch distance) were subsequently bored in the cakes. The comparative trials made in the United States with the perforated cake powder and "mammoth pebble" are stated to have been (under the then existing conditions) favourable to the latter, and the perforated cake eventually took the form of perforated hexagonal prisms.

The object of the cylindrical perforation in both kinds of powder was, as is well known, the diminution of initial pressure in the gun: the burning of the powder taking place from the centre of the hole (or holes) radially outwards, the burning surface would be a progressively increasing one—that of a progressively widening cylinder, and as a consequence the volume of gas would be produced at an increasing rate while the projectile was moving towards the muzzle. Any burning of the prisms in a charge from the outside inwards (or rather, simultaneous burning of all the surfaces of a prism) would, however, work in the opposite direction as regards initial pressure.

In Mr. G. Quick's cake powder, and Colonel W. H. Noble's Sector Powder, there is a return towards the use of perforated cake. Mr. Quick has taken out several patents for improvements in cartridges for ordnance (1884, No. 15,546; 1887, No. 6,360; 1887, No. 17,506; 1888, No. 1,119; the first (1884) is for the pressing of discs or cakes of gunpowder (or other gas-producing explosive) with a larger central cylindrical hole and smaller radial ones, which are connected by numerous radial and concentric channels, either formed on the flat sides of the cakes by suitable means in the pressing, or subsequently cut or drilled in them. The object of these channels is stated to be for the spread of the flame equally and rapidly in all directions over and between the surfaces of the cakes as well as through the perforations in them, so that the whole cake and the whole of the charge may be ignited with great rapidity and burnt with great uniformity. (These objects, it may be noted, differ from those aimed at in the Rodman perforated cake.) The central hole should bear some relation to the proposed diameter and length of the cartridge; the discs may be of any required thickness, from half an inch to six or more inches, and any number may be employed to form a cartridge or charge, the central holes being kept in the centre of the cartridge, and the other holes corresponding to each other. The discs may be of the same diameter as the powder-chamber of the gun; or they may be smaller, and the annular space may be filled with any other description of powder. One of the specifications claims the use of solution of gun-cotton, or of celluloid, or similar material, as a cement or waterproof coating for the individual cakes forming a cart-

ridge; and the 1888 Specification, instead of discs, proposes the compressing of gunpowder or other explosive in the form of segments of a circle (they appear from the drawing to be sectors of a circle), so that when placed together they form rings or discs of a diameter suitable to the powder-chamber of the gun. The segments are provided with projections and recesses to lock the segments of the cakes and the individual cakes to one another, so as to prevent any twisting or sliding movement, the junctions of the segments being so disposed that the segments "break joint" with respect to one another; the whole thus forming a rigid cylindrical cartridge or charge.

Colonel W. H. Noble, in his Specification of December 17th, 1886, No. 16,595, proposes to build up cylindrical charges for guns by putting together a number of pieces of compressed gunpowder (or other explosive), each piece moulded in the form of a sector of a cylinder, with suitable perforations or grooves. The holes in the different layers of sectors are made to coincide so as to form longitudinal holes through the charge. A drawing shows the arrangement of the charge for different calibres, viz.: for 6-pr. quick-firing guns, three sectors, forming the circle of a layer, the sectors simply rounded at the corners, or having grooves along their meeting faces; for a 12-pr. B.L. gun, four quadrants, each with a hole through it, and with rounded corners; and for the 30-pr. B.L. gun, six sextants. This antedates the second of Mr. Quick's specifications just mentioned, in respect to the use of sector-shaped units of charge.

Colonel Noble also claims improvements in the preparation of charcoal for gunpowder, with a view to obtaining charcoal of uniform chemical composition. In charring wood, he proposes to previously crush it, to char some of it rapidly and some slowly so as to produce charcoals containing different percentages of carbon to be ascertained by analysis, and to make a blend of the charcoals in such proportion as to furnish a charcoal containing the desired amount of carbon. Also he proposes to employ uncharred turf or bog-stuff (previously washed, dried, and ground) either alone or mixed with charcoal.

Uncharred peat has, however, been previously used in partial substitution of charcoal in Oliver powder, a slow-burning mining powder of American make. A variety of it, tried by General Abbot previously to 1881, was composed of 75 per cent. nitre, 10 per cent. sulphur, 10 per cent. charcoal, and 5 per cent. uncarbonized peat. He found it to be quite unsuited for torpedoes, but thought that the powder might have valuable properties as a cannon powder, the introduction of peat and the peculiarities of manufacture having retarded combustion.

Smokeless Powders.—Within the last three or four years several preparations, which have been stated to give practically no smoke, have been proposed as substitutes for the old nitre, sulphur, charcoal gunpowders. They consist essentially of nitro-cotton, or other kind of nitro-cellulose, specially treated with the view of producing a slower burning substance, or of nitro-glycerine and nitro-cotton.

The presence of metallic nitrate (other than ammonium nitrate) as a constituent of such powders, would be incompatible with their

smokelessness; if, for example, ordinary nitre or barium nitrate were used, a smoke-cloud of potassium carbonate or of barium carbonate would be produced on firing the powder.

Schultze's powder, introduced some twenty-five years since, and used as a sporting powder, consists essentially of nitro-lignin (grains of wood carefully purified from resinous matter, &c., dried and converted into nitro-derivative by soaking in mixed strong nitric and sulphuric acids) with a considerable quantity of nitrates of potassium and barium. The well-known *E.C. Sporting and Rifle Powders* consist of nitro-cotton (much of which is less highly nitrated than Service gun-cotton) and a large quantity of nitrate (usually nitrates of potassium and barium), with a little resinous or waxy matter; the explosive being formed into small round grains. Both the Schultze and E.C. powders give, as you will see, when fired, a very appreciable amount of white smoke, consisting of carbonates of potassium and barium. They are interesting as being early nitro-cellulose powders.

By the use of a suitable preparation of nitro-cellulose (or similar chemical compound) a practically smokeless powder is attainable, giving, with less weight of charge than ordinary gunpowder, very high velocity to the bullet; and making the lightened cartridge of the small-bore rifle a little lighter.

Vieille's powder (or "*Poudre B*"), which is used for the French Lebel rifle (1886 pattern) of 8 mm. (0·315-inch) calibre, is stated to give to the bullet (weighing 15 grammes, or about 231 grains) a muzzle-velocity of 600 mètres per second (1,968 ft.-sec.), or according to another statement 620 mètres (2,034 ft.-sec.), and to produce little or no smoke.

Service gun-cotton consists mainly of trinitro-cellulose, $C_6H_7O_2(NO_3)_3$, and produces when fired a much greater volume of gases¹ and a much higher temperature than ordinary gunpowder (black or brown); properties which, combined with the great rapidity with which it burns in the fibrous condition, are the causes of the high initial pressures which it is capable of producing in a rifle or gun.

Several patents have been taken out for the production of a nitro-cellulose powder which shall burn at a moderated rate, and consequently cause less initial pressure in the weapon.

The preparation of the *Johnson-Borland powder* is based on the patent of D. Johnson (1885, 24th July, Specification No. 8,951); the patentee uses nitro-cellulose, obtained by the nitration of cotton or wood, and preferably dinitro-cellulose, and the essential feature of the invention is the hardening of the grains or blocks of nitro-cellulose by heating with camphor. An oxidizing agent—nitrate of potassium or of barium—is added to the dinitro-cellulose, and an addition of carbonaceous material may also be made; for example, the patentee proposes for military firearms a mixture of 50 per cent. by weight of

¹ I should mention that gun-cotton when fired gives (not taking into account the small amount of mineral matter) wholly gaseous products of combustion; when it is fired in a closed vessel, these are carbonic acid, carbonic oxide, gaseous water, hydrogen, and nitrogen. Inflamed under only atmospheric pressure, nitric oxide is also produced.

nitro-cellulose, 40 per cent. nitrate of potassium, and 10 per cent. of torrefied starch or of lamp-black. The nitro-cellulose or nitro-cellulose mixture is to be formed into grains, prisms, or other required form, then dried and saturated with a solution of camphor in a volatile solvent, such as will evaporate below 100° C. (212° F.). Light petroleum or benzoline is a suitable solvent, and good results are said to be given by employing 10 parts of the nitro-cellulose or mixture, 1 part of camphor and 5 parts of solvent. Half the weight of the camphor may be replaced by phenol (carbolic acid). The solvent is then distilled off by gentle heating and recovered; the camphor is left in the solid state, intimately mixed with the nitro-cellulose. The material is then heated in a closed vessel at a temperature not exceeding 100° C. (212° F.). At this temperature the camphor is stated to have a remarkable gelatinizing action on the nitro-cellulose, and to produce a hard material, the hardness of which can be regulated by varying the proportion of camphor used.

The camphor may then be sublimed off from the explosive at a gentle heat, or dissolved out from it by means of light petroleum, and the explosive dried. It is claimed that the prisms or grains of nitro-cellulose are, by this treatment, hardened throughout and not merely surface hardened, and that the required slowing of the rate of burning is thereby caused; while, on the other hand, there is no tendency to hang fire, the nitro-cellulose practically retaining its fibrous structure.

The action of camphor on the less highly nitrated cellulose to produce a mass plastic when warm, hard when cold, has long been known and utilized in the manufacture of celluloid.

Nitrate of potassium or barium, when present in the Johnson-Borland powder, as already mentioned, would be incompatible with smokelessness.

In the three following patented processes the nitro-cellulose is dissolved or gelatinized in a solvent, by which treatment the fibrous character of the material is destroyed and a horny product obtained, burning in the rifle or gun at a slower rate than in the fibrous condition.

F. Engel (Specification No. 6,022, April 25th, 1887) nitrates vegetable fibres, woody matter, or other form of cellulose in the usual way (*i.e.*, by steeping in mixed nitric and sulphuric acids), washes and dries the nitro-cellulose, and treats it with acetic ether or acetone or other like solvent. The action of the solvent is assisted by mechanical kneading in a suitable vessel until a viscid paste or gelatinous mass is obtained. To this mass a certain amount of oxidizing compound (such as potassium or barium nitrate, potassium chlorate, &c.), and a small proportion of a hydrocarbon such as naphthalene may be added. The mass is then formed into cake, or into any required shape, the solvent allowed to evaporate, or by suitable means distilled off, condensed, and recovered. The powder is left as a dense, horny substance, with a hard glassy fracture, and which can readily be granulated. The claims of higher velocity of projectile and less pressure, of very much less smoke and residue than with any ordinary gunpowder, are made for it; and a smaller charge than of the latter is said to be required. When the

above-mentioned oxidizing salts are employed, there must, however, be an appreciable amount of smoke from the powder.

F. C. Glaser's patent (1887, 13th December, No. 17,167) has the greatest possible similarity to Engel's; the same solvents are used and the same mode of procedure followed, Glaser, however, uses his cellulose in the state of paper or cardboard in sheets or strips, or other manufactured form, which are converted into nitro-cellulose in the usual way, then gelatinized by the action of a solvent. The gelatinized sheets are either dried separately or in layers, in the latter case the layers will adhere during the drying. As in Engel's specification, an oxidizing salt and a hydrocarbon may be added.

I should mention that the solubility of trinitro-cotton in acetic ether has been known for more than thirty years.

E. Turpin has also patented means for the production of an improved smokeless powder for firearms (1888, 20th March, No. 4,310). He prepares a paste by dissolving gun-cotton (more or less nitrated) in a suitable solvent. For the most highly nitrated gun-cotton, he proposes as solvents a solution of ammonia in ether, or a mixture of acetone and ether. He appears not to use acetic ether on account of its high price. He states that the trinitro-cotton ("insoluble gun-cotton") is in great measure soluble in a solution of the less highly nitrated cotton in ether, and gives proportions for forming by this means a gun-cotton paste. Sheet is to be formed from this paste by mechanical means indicated, and the sheet of paste is to be equalized in thickness by being warmed and passed between metal rollers; it is to be of three times the thickness it should finally have, to allow for shrinking on drying and for further rolling. The sheet of paste is then freed from solvent by drying it in the open air, or in apparatus which permits of the condensation and recovery of some of the solvent.

The sheets of gun-cotton, when nearly dry, are subjected to further pressure to reduce them to the required thickness, the pressing being assisted by softening the sheets with ether. The sheets are then cut up into strips, and then cut crosswise, to form small cubes or grains, which are sorted by sifting.

The smaller the grains, the more rapid will be the rate of burning, and the higher will be the initial pressure and the velocity of the projectile. The size of the grain should be proportional to that of the calibre of the gun, a powder of a grain of 1 cubic millimètre (0.00006 cubic inch) for a calibre of 10 millimètres (0.394 inch) being taken as the basis of computation. For artillery it is stated that the powder need not be granulated, but may be used in the form of strips of the same length as the chamber of the gun, and square in section, with side of square proportional to the calibre of the gun. The weight of charge of the new powder, according to the patentee, would generally be half that of ordinary black gunpowder, and would give a higher velocity.

If the powder should burn too quickly for some purposes, *e.g.*, for Congreve rockets, a small addition of camphor and of oxidizing salt is to be made to the powder.

The last powder of this class that I shall mention is that of Mr. A. Nobel, the eminent founder of the nitro-glycerine industry. It is a horny preparation, composed of nitro-glycerine, nitro-cotton, and camphor. It is a kind of blasting-gelatine, with the proportion of nitro-cotton greatly increased, and with the addition of camphor. The resulting product is described in the Specification (1888, 31st Jan., No. 1,471) as somewhat resembling celluloid in appearance, as being easily formed into grains or pellets of any shape, and as burning in firearms with the tempered velocity needed to render it a fit substitute for gunpowder, over which it is stated to have the advantages of greater power, of leaving almost no residue, and of being smokeless or almost smokeless. The permissible range of variation of the constituents is a wide one, but it is stated that when the proportion of nitro-glycerine exceeds two-thirds of the compound, it is rather too soft; and when the nitro-cellulose exceeds two-thirds, the product becomes too tough and hard to be easily granulated.

The camphor is stated to be added to assist the solution of the nitro-cellulose (usually the less highly nitrated nitro-cotton in the form of dry pulp), but it no doubt helps to make a slow-burning product; some other substances are mentioned as substitutes for the camphor. A suitable proportion of camphor is said to be 10 to 30 per cent. of the weight of the nitro-glycerine; more camphor being needed to assist the solvent action of the nitro-glycerine, the greater the proportion of nitro-cellulose employed.

In making those preparations in which the nitro-glycerine is predominant, the use of a volatile liquid in which the nitro-glycerine and camphor will dissolve is recommended. Benzol is mentioned as being very suitable. When the nitro-cellulose is the predominant constituent, the formation of a paste is facilitated by the use of a volatile solvent of nitro-cellulose, such as acetic ether or acetone.

Two examples of mixtures are given, representing about the extremes of variation of the constituents which may be employed with success:—

In 100 parts by weight of nitro-glycerine, 10 parts of camphor are to be dissolved and 200 parts of benzol added. In this mixture, 50 parts of dry soluble nitro-cotton pulp are to be steeped. The benzol is then evaporated and the material mixed by passing between rollers, which are hollow and heated by means of steam to 50° or 60° C. (122° or 140° F.). When uniform, it is rolled out into sheets and cut up into grains or moulded, and is then ready for use as a gunpowder.

Or, when it is required to reduce the amount of nitro-glycerine as far as practicable, 100 parts by weight of nitro-glycerine, 10 to 25 parts of camphor, and 200 to 400 parts of acetate of amyl are mixed, and 200 parts of dry soluble nitro-cotton pulp are steeped in the liquid. The mixture is to be kneaded and mixed until the nitro-cotton is dissolved, and the resulting paste is formed into thin sheet, from which the solvent is removed by heat, and the dry material cut up into grains, &c., as before.

With the view of shortening the operation of mixing (and thereby diminishing loss of solvent), it is proposed to substitute for the greater

part of the soluble nitro-cotton a more easily soluble nitro-cellulose, such as nitro-starch, nitro-dextrin, or nitro-lignin.

The mode of using the explosive differs, it is stated, from that of gunpowder only in so far that the charge for fire-arms must be proportioned to the relative power of the explosives.

For the preparation of a sporting powder, for which smokelessness is not essential, the addition of a moderate amount of oxidizing salt (such as potassium chlorate or nitrate) or of picrate is advantageous.

Here is some of the powder in grains, suitable for use as a rifle powder. It burns readily in the open air on applying flame, and produces almost no smoke.

It would have been desirable for me to have given some information as to the ballistics given by these powders in actual use, but I cannot do so, as some of them are being experimented with by the Explosives Committee, and are still under consideration.

The foreign military periodicals of last autumn stated that the Wetteren factory was making a "paper-powder," having great similarity to the French "Powder B," and intended for use in the Belgian small-calibre rifle; also that the German Government had contracted with the Rottweil-Düneberg and the Rhenish-Westphalian Powder Companies for the supply of a smokeless powder for their new small-arms ammunition.

On the other hand, a Spanish military periodical stated last December, that the powder for the Lebel rifle deteriorated rapidly, owing to the chemical decomposition of the nitro-cellulose which it contained, and that only the recently manufactured powder gave the remarkable ballistics attributed to it, there being a notable falling-off in the velocity given by the powder a few months after manufacture. It stated that, in consequence, the French had decided to give up the new powder and to revert to the use of a good type of black powder.

I will conclude this section of my subject by giving the substance of an article on "Smokeless Powder" in the French periodical, "*L'Avenir Militaire*," of 25th December, 1888. The writer states that it is well known that the cartridge of the 1886 pattern rifle is charged with a special powder, a powder which is certainly the most important factor in the superiority of the new weapon over the old one. The powder imparts a high muzzle-velocity to the bullet, with but little strain on the breech mechanism, and but little recoil, and produces only a very thin bluish smoke, invisible at a moderate distance, and causes a comparatively feeble report. Their field artillery will, he states, shortly be charged with the same powder, a considerably lighter charge of which will be required. The reduction in weight per round will be about 1 kilogramme (2·2 lbs.), so that an ammunition-wagon usually carrying 75 rounds would be able to take 8 or 9 more rounds, or have the advantage of greater lightness.

As regards the influence which the use of a smokeless powder would have on tactics, the writer remarks that the subject is at present conjectural, but some obvious consequences can be foreseen. In the case of artillery, the use of smokeless powder against an enemy simi-

larly provided would render precision of aim possible, and would allow the effect of the fire to be seen. A small drawback would be that it would be more difficult to execute the movement recommended for avoiding the effects of well-directed fire from the enemy, viz., advancing the guns by hand by about 50 mètres (55 yards), a movement favoured by the cover of smoke.

As regards infantry, he thinks that the question is more complex. The smoke-cloud with the old powder is less dense than in the case of artillery, and interferes less with the maintenance of effective fire. The smoke shut out the sight of death and suffering, and gave a sense of protection: a false sense, however, as the smoke really betrays the infantry's position. By these remarks the writer does not mean to find fault with the adoption of "Powder B;" on the contrary, he regards it as a necessary accompaniment of a reduction of calibre of the rifle, the old powder causing too much fouling. If the enemy were also provided with a smokeless powder, the balance of advantage would be equalized; both sides would have to modify existing tactical arrangements. Surprise would be a factor of the greatest importance in the use of artillery, and still more of infantry; the latter can find footing anywhere and remain unnoticed for a long time while keeping up fire, the smoke alone betraying their whereabouts. Hearing, it is stated, will not be able to take the place of sight in judging of the direction from which firing with smokeless powder proceeds, Colonel Sébert having recently shown that the apparent direction differs much from the true one, on account of the disturbing influence of the projectile on the sound-waves produced on firing.

I have left myself so little time for the consideration of other explosives than gunpowder, as to make the title of this paper virtually a misnomer. I venture to refer you to a recent paper of mine on explosives, which will be found in the "Journal of the Society of Arts" of December 14th, 1888, in which mention is made of some of the more important inventions which have been made in explosives of late years.

I have had to decide whether my concluding remarks should be on the subject of trials of gun-cotton shells in Germany and Italy, or on the arrangements of the Graydon shell, in which a small bursting-charge of dynamite has been fired successfully from an ordinary gun by means of gunpowder; or on the ingenious Zalinski shell and fuze, which was successfully fired in the United States in January last from the 15-inch pneumatic gun, the shell containing a charge of 200 lbs. of blasting gelatine and dynamite; or whether I should briefly consider picric acid as an explosive. I have chosen the latter subject, as perhaps more readily offering some points of chemical interest.

Picric acid is trinitrophenol, $C_6H_3(NO_2)_3O$, and is produced by the action of nitric acid on phenol or carbolic acid, C_6H_5O , a body contained in coal-tar. It is not a nitric ether like gun-cotton or nitro-glycerine, in which NO_2 replaces H in the OH of glycerine or cellulose, forming a nitrate or nitric ether, ONO_2 ; but NO_2 directly replaces H in the carbolic acid, leaving the OH free to form salts. Thus, phenol or carbolic acid, C_6H_5OH , picric acid or trinitrophenol, $C_6H_2(NO_2)_3.OH$,

and potassium or ammonium picrates, $C_6H_2(NO_2)_3.OK$, or $C_6H_2(NO_2)_3.ONH_4$.

Picric acid is a pale-yellow crystalline solid. The commercial acid melts at about $250^{\circ} F.$ to a pale-yellow liquid. The resolidified acid has a specific gravity of nearly 1.7. The acid, when heated in the open air, melts, takes fire, and burns with a smoky flame quietly, at least so far as I have seen it in quantities of a pound. Several of the metallic picrates (*e.g.*, the picrates of potassium, calcium, strontium, barium, and especially of lead) have long been known to be capable of detonation when heated or struck. I will heat separately on pieces of tin-plate a small quantity of dry picric acid, and of ammonium picrate; 2 grains each of dry potassium, barium-, and lead-picrates. The acid and the ammonium salt burn away quietly with a luminous and smoky flame; the potassium picrate gives only a brisk deflagration, somewhat like what a few grains of gunpowder would give. The barium picrate gives a loud, and the lead picrate a still louder, report.

A mixture of potassium picrate and nitre was introduced twenty years since in France, for torpedoes and shells, by Désignolle; and with the addition of charcoal, for powder for cannon and small-arms. Sir Frederick Abel's picric powder, and Brugère's powder, both composed of ammonium picrate and potassium nitrate but in different proportions, were introduced soon afterwards. From that time to the present, a predilection for the use of picric acid or picrates as explosives seems to have existed in France.

Dr. Sprengel, in 1873, first recorded the fact that picric acid can be detonated by means of fulminate of mercury, and that it was a powerful explosive.

E. Turpin has patented (December 25, 1885, No. 15,089) the use of picric acid as a detonable explosive for military and other uses, *e.g.*, for charging shells or torpedoes, or for demolition and mining work. He states that in the state of dry powder it can be detonated by 1.5 gramme (about 23 grains) of fulminate of mercury, and to lessen its sensitiveness proposes to agglomerate it by means of collodion, &c., and mould it into the required forms, or preferably to melt the picric acid, and pour it into the containing vessel. In the fused condition, a suitable intermediate priming is said to be required.

Picric acid is a powerful explosive, and where as much as possible of an explosive has to be got into a given space, its high specific gravity after being fused gives it an advantage.

Picric acid is the predominating constituent of "*mélinite*," introduced into service use in France in 1886-87 for charging shells. *Mélinite* appears to contain another constituent; the present *mélinite* may differ from the earlier, but in the beginning of 1887 it was stated that ether was largely used in its manufacture; and about that time large quantities of ether were imported into France. If used for *mélinite*, it may have been to cement together picric acid grains by means of collodion (a solution of dinitro-cotton in ether and alcohol). The name *mélinite* probably comes from μέλι, μέλιτος, *honey*, from the yellow colour of picric acid, and may have been an

anagram of the too obvious word *mélitine*. I believe, too, that I have seen the word derived from the name of M. Méline, who was one of the French Ministry at the time of the introduction of *mélinite*; this latter etymology may, however, be quite hazarded.

It is questionable whether the quantities of carboic acid available for the manufacture of picric acid would be sufficient to meet large and continued demands for the latter. The available supplies of cotton for making gun-cotton, and even of glycerine for nitro-glycerine, are much less likely to be affected by a run upon them than those of carboic acid which depend on the amount of coal-tar produced, mainly in gas-making.

"Broad Arrow" states that a substance called "cresilite" is being used at Toulon Arsenal for charging shells. It states that it is melted in copper vessels, and poured into the shells in quantity sufficient to two-thirds fill the chamber; the remaining third of the space is then filled with *mélinite* rammed in by means of a mallet.

"Cresilite" is, no doubt, a nitrocresol, a substance having great chemical similarity to picric acid, and also obtained from a coal-tar product. This is a specimen of commercial nitrocresol, stated to be trinitrocresol.

From French and German statements, it appears that a vault of concrete 10 feet thick (not covered with earth, which would act as tamping to the explosive) may be considered as almost invulnerable to the attack of the present *mélinite* shells.

Colonel SHAKESPEAR: Colonel Brackenbury and gentlemen, as this question of powder has been before me for some few months I am very glad to have seen the splendid exhibition that we have had this evening. It occurred to me that we should much like to know what goes on inside our barrels. You might say that was rather a difficulty to begin with, and perhaps it might alarm a good many people. I have brought with me two glass tubes representing gun-barrels, and those tubes were charged from the old powder-flask of days gone by, so that I might get exactly three drachms, and you can see as the result the astonishing amount of dirt there is in one of the tubes as the result of firing the ordinary powder. Another tube was charged with smokeless powder, Hengst powder, which was duly announced in the "Times" just a fortnight ago. I heard of it some time before that, and I have made a good many experiments with it. All I can say about it is absolutely this, that I cannot find it is anywhere wrong. I have not yet tried its propellent powers. I wanted to get down to Shoebury and try it at 2,000 yards; that I have not been able to do, but I have tried it as ordinary sporting powder, and with a small pistol I have driven a bullet through a half-inch board. If you look at the tube there is just a little deposit, but practically speaking it is perfectly clean. That represents what will go on inside our guns if we use that description of powder. I have also here two bottles. In one of them I fired three drachms of this Hengst powder, and you will see the jar is practically perfectly clean. The other bottles show the result of burning three drachms of Curtis and Harvey's best sporting powder, and you see it is opaque. As I have said I have tried the simple propellent power of these powders across my dining-room, and I am inclined to think the smokeless is rather the best, but I rather venture that because I cannot speak with perfect certainty.

Captain CURTIS: Might I ask if those bottles were dry?

Colonel SHAKESPEAR: They were perfectly dry. I am an artilleryman, and we are wonderful hands at doing everything for ourselves. The bottles were washed by myself, cleaned out by myself, and dried out by myself, for the purpose of satisfying myself perfectly that they were so. When this Hengst powder was first

put into my hands it had such marvellous stories attached to it that I was determined to prove them. It was said that water produced no effect whatever upon it. What did I do? I soaked two ounces for forty-eight hours, dried it and fired it, and found it was perfectly good. I boiled two ounces for forty minutes, dried it, and it was just as good as before. I steamed two ounces for twenty minutes over copper-wire gauze, and alongside of it I had the same quantity of sporting powder. I fired them without drying them, when the black powder fused, but this powder exploded only rather slowly. I did that purely to see whether it was true that moisture did not make any difference.

Mr. NORDENFELT: Where is that powder made?

Colonel SHAKESPEAR: It is made in England.

Mr. NORDENFELT: What is the power of it?

Colonel SHAKESPEAR: I have not had time to test it. I have made some arrangements with a friend of mine to go and have a quiet shot on the sands at Shoebury. I have only tested it, as I said, in my own dining-room, where I have sent a bullet through a half-inch deal board.

Mr. NORDENFELT: What is the velocity?

Colonel SHAKESPEAR: I cannot tell you.

Mr. NORDENFELT: The penetration?

Colonel SHAKESPEAR: I have not got so far as that. Colonel Sir George Maude, C.B., the Crown Equerry, Captain Norton, and myself, three Officers of the Royal Horse Artillery, fought our guns at the Battle of Balaclava, 25th October, 1854, until our ammunition was gone. While together yesterday we spoke of the great advantage of a "smokeless" powder, since after about ten rounds each gun had to pause till the enemy could be again seen, so dense was the smoke that gathered about the guns on that still morning.

Captain CURTIS: I should like to ask the lecturer one question. I do not think he mentioned the charging of the Graydon shells. I have heard that the shell is lined with asbestos in the interior, so that they can fire the shell when charged with high explosives. Perhaps the lecturer can give us some information upon that.

Admiral BOWDEN SMITH: I should like to ask the lecturer whether he thinks there is any danger in carrying these cartridges with the new powder in large numbers on board our men-of-war, where possibly they may be subject to the effect of very high temperature.

Mr. ERNEST SPON: I speak with a good deal of diffidence before an assembly of experts, but I speak rather as representing the manufacturing side than the experimental side on the subject of explosives, with which I have had to do for the last ten years. I should like to ask one or two questions. First, as to the smokeless powder. The lecturer referred to two very interesting experiments, one with the Schultze and one with the E.C. powders. I should like to know what was the date of manufacture of each of those powders, because you must bear in mind that these powders have now been made, one of them perhaps fifteen and the other certainly five or six years. At the time when they were first introduced they were introduced purely and absolutely as novel sporting powders, and it is excessively probable, in fact, I think it is more than probable, that large and material alterations have been made by the manufacturers in each of these powders at the present time; therefore, if we are dealing with these powders at the present time we ought certainly to see their results from very recent samples. With respect to powders containing nitrate of ammonium, I can only wonder that any manufacturer has attempted to experiment with them, because a person who is practically acquainted with the laboratory, as our lecturer is, will be aware that nitrate of ammonium is such a deliquescent salt that it is almost valueless for any purpose in which you require the materials to be kept for any long period. With respect to the Nobel, I have not made this powder, but from its description it appears to me to be a compound of nitro-glycerine, nitro-cotton, and camphor. One objection, which I think will almost entirely prevent it coming into use, is the excessive danger of its manufacture. Nitro-glycerine is a very dangerous substance to manufacture. Nitro-cellulose is not dangerous to manufacture, but in the condition in which he proposes to use it in its composition, that is to say, in the form of pure cellulose in a highly divided state, it is certainly not

a pleasant substance to have to deal with, and should only be handled and dealt with by experienced chemists, as I know to my cost. The compound of these two will be a manufacture that at all times and in all places will require skill of such a character, and the cost of the material itself is of such a character, that I am quite of opinion will entirely preclude its common use. That is a question that must always be borne in mind in the manufacture of powders of any kind. There are some powders that we can make in the laboratory which give most remarkable results, but the majority of those very remarkable powders have such excessive cost, and can only be prepared with such high technical skill, as to place them entirely outside the range of practical technology. In conclusion, I notice that Mr. Deering has not alluded to one or two of the more recent forms of mechanical mixtures of di-nitro-benzole with either of the nitrates. One such preparation that I am acquainted with is entirely satisfactory, its keeping properties are most excellent. It can be prepared in an emergency in almost any town that possesses a large commercial chemical store. I mean to say the materials are almost always available. It is certainly one of those explosives that ought to be better known to military men than it is at present, and in the future I am sure it is one of those explosives that on emergency will always be availed of and used: I allude to securite.

Mr. NORDENFELT: It is exceedingly gratifying that men who have studied the subject so deeply as Mr. Deering has, should come forward and tell us all about it. The question of smokeless gunpowder—I do not now speak chemically but from a practical point of view—must be of the greatest importance. The French are employing smokeless powder not only for their rifles and small guns, but for guns up to 6, 7, 8 inches and more. We naturally in this country will have to do the same like everybody else. It is not a question any longer of whether we shall have smokeless powders or not; it is a question of which smokeless powder we must have. I think we owe a tribute of thanks to the Government Department and the Committee for not rushing into a question of this kind and deciding upon a powder and finding afterwards that there is something wrong about it. I may say that generally the Committees of this country do not rush into conclusions. Sometimes it takes them a considerable time to make up their minds, but on the whole I think there is an advantage in exercising such care. Of course France is in a different position altogether; they are liable to the risk of attack any day, they must therefore provide for something at once. Our position as an island, perhaps, keeps us safer in that respect, and on the whole I think we are thankful that the question is not decided too soon. But I repeat again that as far as my small experience goes, it is not a question any longer of whether we are to have smokeless powder or not, it is a question of how soon we can get a reliable smokeless powder. And I mean not only a powder which gives no smoke, but a powder which gives the least pressure per velocity, which leaves the barrel clean, and enables the man who aims the gun to see the immediate effect of his shot and shell. As a manufacturer of quick-firing guns I speak very feelingly, because these guns are on the order of the day, as weapons which must come in very largely for all purposes. The quick-firing gun, like the larger gun, even if not quite dependent upon it, has become very much more valuable since we have smokeless powder to fire. I can imagine in the Navy the advantage is somewhat less because there is always a draught, but in the field when the wind is at your back and very little of it, you have to wait after every few rounds; and the idea that you are covered by smoke is incorrect because the enemy fires into the smoke and with a very fair chance of hitting. Especially for English service, where we have to fire sometimes against undisciplined troops and natives in all parts of the world, I can imagine nothing so awfully demoralizing as the case of a number of natives who are being shot down without having the slightest idea that any shot is being fired, without seeing where it comes from, or knowing anything about it beyond the actual effect of the fire. I believe the nation will some day thank those gentlemen who have given their best intelligence to produce smokeless powder with the higher velocity, and the lower pressure which it gives.

Mr. J. D. DOUGALL: It was not my intention to speak to-day, but having had some connection with the subject of smokeless powder for many years, that must be my apology for doing so. It is a very interesting fact that on March 30, 1868,

a lecture was given in this theatre by my father on a powder that was likely to take the place of black gunpowder. That was known as Schultze's powder, therefore you can well see that for 21 years I have been more or less in touch with the subject. I am not in a position to add much to the learned paper which has been read, not being a chemist, but being a gunmaker I look at the subject from a gunmaker's point of view. I presume I may be permitted to say as far as regards smokeless powder, I have been engaged for the last two years in establishing in this country a powder of that nature for rifles, and I have been using it for the Martini-Henry, for the O'400 and for the O'303, and in all respects that powder has fulfilled the requirements of those who say that such powder must be acquired. So far as I am aware no vital objection could be taken to its keeping qualities, so that I think we have in this country perhaps one of the best powders which can be produced for military purposes.¹

The CHAIRMAN: It seems to me that the discussion would be rather like the play of Hamlet with Hamlet left out, unless we have a word from Sir Frederick Abel on this subject, which he has made his own.

Sir FREDERICK ABEL: I came here simply to listen. I was personally anxious to hear how my old friend and colleague, Mr. Deering, treated a subject replete with difficulties to him, because, in the first place, he has been overwhelmed with matter, and it was impossible for him to deal with the whole subject, and to bring in some of the more recent varieties of explosives, such as those to which Mr. Spon has referred; and, in the second place, because he was naturally somewhat under restraint in his official position, having knowledge communicated to him which he could not use with that freedom which he might desire. I think we may congratulate ourselves upon the success with which he has treated this comprehensive subject. I have been listening with much interest to the discussion, and especially to the remarks of two gentlemen. I venture to think in reference to those which were made by Mr. Spon that he has a little exaggerated the practical difficulties arising out of the dangerous nature of the manufacture, or out of the great cost which the producers of Mr. Nobel's smokeless powder will have to contend with. Danger is almost impossible to dissociate from the manufacture of explosives, but I need hardly remind him, although he may have had some unfortunate experience in connection with the manufacture of nitro-glycerine, yet that the proportion of accidents which attend the production of the enormous amount of nitro-glycerine products which are used all over the world is very small indeed, in fact, I believe, much smaller than in the case of gunpowder. With regard to the cost of smokeless powders, it is true in some instances the sources of supply of materials from which certain of this class of powder is produced are comparatively speaking limited, but I have not yet met with any case in which demands have arisen for products of new application where we have not had a supply to follow the demand, and I think this will be found to be the case even with such substances of a comparatively costly character as some of those which are being used in this comparatively early stage of the history of the production of smokeless powder. Mr. Nordenfelt has dwelt upon the importance to the country of supplying smokeless powder. It is well to know that, although we are only upon the threshold of its history, we already are obtaining results which give promise of fulfilling the most sanguine expectations of those who desire to use smokeless powder in the military and naval Services. But whilst Mr. Nordenfelt, in his good-humoured way, spoke banteringly of the somewhat slow proceedings of Committees, and of their deliberation, I am sure he will heartily agree with me, in fact, he has done so, in the necessity for extreme caution before we go so far as to say that we will adopt for our ships and for our forts powders possessing characteristics which, with all the knowledge of the chemist, are as yet not thoroughly understood. It is not merely important to have powders showing such low pressures with such high results as regards velocity as to give great advantages over gunpowder, both in this direction and as regards freedom from smoke and fouling, but it is also absolutely indis-

¹ The powder referred to by Mr. Dougall is the S.R. powder of the Smokeless Powder Company (Limited), who are now erecting works for its manufacture.

pensable that a powder of that description should be so stable in its character that it should stand without any change not merely years of storage in our own magazines at home, damp or dry, but also storage on board those ships where magazine accommodation has to be found in localities which are, at any rate so our constructors of ships at present seem to think, almost impossible to keep moderately cool. We have had records of magazine temperatures as high as 140° Fahr. sent home from ships at some of our stations abroad, and, although I am one of those who believe that these temperatures should not be allowed to exist in the magazines of H.M. ships where every difficulty is dealt with by a practical cure as it arises, as such a condition of things may even under the most favourable circumstances accidentally occur, we must see that the powder of the future is a powder which will not endanger our sailors, or the safety of our ships, through want of stability under all conditions at all likely to arise upon service.

MR. DEERING: Sir Frederick Abel, in his kind remarks, has met some of the objections to which I should have replied. The objection has been made that there are a great many things I have not mentioned. Of course I have had to keep my paper from extending much beyond an hour, and the things I could possibly get through have necessarily been very limited. I could not touch on the ballistics given by the various smokeless powders, because they were under examination. To come to some of the remarks in detail, Colonel Shakespear's interesting observations are covered by my statement that trinitro-cellulose burns away into products wholly gaseous, and that where nitrates are present there will be carbonates and some amount of fouling. Captain Curtis spoke about the Graydon shell. I did just mention it in passing. As he quite correctly says, in the Graydon shell the charge of dynamite was kept from the metal of the shell by a packing of asbestos cloth, and between the powder charge and the base of the shell there were some thicknesses of asbestos mill-board. The arrangements certainly were very ingenious and very interesting, but up to the present time I think only some two or three pounds of dynamite have been fired in this shell, and that seems rather a small quantity, especially when we compare it with the very large quantities recently fired from the 15-inch pneumatic gun in the Zalinski shell: about 200 lbs. of blasting gelatine and dynamite. Admiral Bowden Smith enquired about the liability to decomposition of nitro-powders in the ship's magazine, but that Sir Frederick Abel has been kind enough to answer for me. The temperature of a magazine is sometimes 130° or 140° —I think I have seen a record of 170° in the case of a ship in the China waters, and that would, certainly, if continued for months, put a strain upon the stability of the whole class of nitro-powders. They would need to be extra well washed and purified, and even then the high temperature would become somewhat of a strain when continued for so long a time. Mr. Spon has made numerous interesting points. With reference to what he said about securite, I stated that my paper would mainly be about gunpowder, and ventured to refer members to a paper in which securite is mentioned among other nitrate of ammonium explosives. As to the E.C. powder, although I showed that it gave smoke, I did not in the least mean to depreciate it. A recent analysis for the Home Office showed that E.C. powder contained a large quantity of potassium and barium nitrate which must produce smoke. I mentioned this powder really more in its historical connection, in a complimentary rather than depreciative sense. As to nitrate of ammonium powder and the difficulties attending its use, when a firm like Krupp's has used it in guns up to 6-inch (in ordinary cartridge cases, but mainly in metallic ones) with excellent results, the subject has already been carried beyond the stage of small experiments. The use of such a powder, therefore, cannot be quite set aside on account of our laboratory experience of the hygroscopic properties of nitrate of ammonium. To return to Colonel Shakespear's remarks about Hengst's powder: it consists essentially of nitro-straw, and like other kinds of nitro-cellulose gives wholly gaseous products of combustion. There is an account of it given in the "Times" some three weeks ago; the results were encouraging, but not specially remarkable.

THE CHAIRMAN: Before thanking our friend Mr. Deering for his very interesting lecture, I should like to make one or two remarks, which will not detain you long. In the first place, I must guard myself by explaining that I am not in the secrets of the Explosives Committee, and, therefore, what I am going to say is not in any

way official or drawn from official sources. But there have been put into my hands from private sources one or two little notes on matters which may perhaps be interesting, and of which our friend here did not like to speak. Among the powders which are now the subjects of experiment there is one called the "Chilworth Special," with reference to which Major Jones, of Sir W. Armstrong and Co., said lately in a lecture, a copy of which I have received from him this morning, that it gives almost ideal curves as far as the pressures in the gun are concerned, and also a high muzzle velocity. In the 4·7-inch gun it has given 1,990 feet muzzle velocity to a 45-lb. projectile, with $13\frac{1}{2}$ tons maximum pressure. The Armstrong firm have, I believe, taken a good deal of it, and our Government is experimenting with it. Unfortunately, it is one of those powders which absorb moisture very rapidly, and which have to be kept, therefore, carefully from the air; but all powders should be kept from the air. It produces very little smoke and no solid residue. Then for small arms there is the R.C.P., of which Germany has taken large quantities. It has given the following results in our new small-bore rifle. A 45-grain charge gave 2,350 feet muzzle velocity with 19 tons pressure. If we compare this result with the black powder charges which are in use till one of these smokeless powders is decided upon, we find that the black powder pressed into pellets is required by specification to give 1,810 feet muzzle velocity with 19 tons highest pressure and 18 tons mean pressure. Thus we have a sort of idea of the difference between the black powders and one of the new smokeless powders. The French Government have used in their Lebel rifles a smokeless powder, but they have changed at least twice, and do not appear to be satisfied even now. For their field-guns they are using, I believe, one of the forms of gun-cotton treated with some other substance. And now for a few words on another point. We frequently see in the paper statements that English guns have been designed to match the German slow-burning powders, as if these were introduced before the guns were designed. Now, gentlemen, I beg leave to state that the first experiment in the manufacture of slow-burning powders and the first slow-burning powders which were made were tried and manufactured at Waltham Abbey under my superintendence, and the German slow-burning powders came in a considerable time afterwards, and after many of the new guns were constructed. Therefore, I think you may see that England led the way in matters of that sort. When I gave a lecture here in 1884 I explained and showed these slow-burning powders made at Waltham Abbey. I also showed the brown powder which had then come forward (long after ours had been introduced). The first kind of brown powder was originally discovered by an accident, but, as the brown powders turned out to be superior to the slow-burning black powders which we then made at Waltham Abbey, and as the inventors had most frankly communicated the secret to Waltham Abbey, I, as in duty bound, at once recommended that they should supersede the slow-burning powders which we had there developed. I am sure I shall be following your wish in thanking Mr. Deering for the extremely interesting lecture he has given us.

Friday, April 12, 1889.

CAPTAIN SIR JOHN C. R. COLOMB, K.C.M.G., M.P., Member of
Council, in the Chair.

ON THE UNPROTECTED STATE OF BRITISH COMMERCE AT SEA.

By Lieutenant W. C. CRUTCHLEY, R.N. Reserve.

It is some years since I first had the honour of reading a paper in this theatre, but the time which has passed since then has merely strengthened my convictions that the subject-matter then dealt with is of great and absolute importance to Great Britain generally. I have watched with the greatest interest and pleasure the steps which have already been taken for the better security of our vast properties at sea, and the only way in which one can find fault is, that they do not go far enough, and so I say, "Yet for a man may fail in duty twice, and the third time may prosper."

I do not know that the foregoing words are quite appropriate, but they come to my mind as a reason for another effort to bring this great subject forward. With all Europe an armed camp, with Britain the avowedly first enemy at which ambitious Powers would strike, with the knowledge that failure on our part to protect ourselves would be irreparable, we still continue to display a singular disregard to the claims which our enormous properties at sea undoubtedly have to be protected from the hands of covetous neighbours, and this disregard I feel convinced is solely because the majority of people have never grasped the meaning or magnitude of the question at issue.

I think that my remarks may be classed under four heads—

1st. The necessity of protection of our trade at sea at the commencement of war.

2nd. What would probably happen under existing circumstances on the particular routes touched upon.

3rd. The necessity of an organization of mail steamers to assist the first point mentioned, and the urgent necessity of arming them.

4th. Sketch of a plan of convoy for the Cape route, and some remarks on the vital need of such depôts as the Falkland Islands and Sierra Leone.

In approaching this subject, I must say that I do so with great diffidence. I should scarcely care to be considered an alarmist; but

all the discussions which have taken place lately on the subject of our Navy have, as far as I have seen, been solely confined to the ability of our men-of-war to meet successfully those of our possible antagonists; the protection of the greater part of the commerce of the world has not been touched upon at all, and it is in the hope of assisting to prevent the temporary (it may be) stoppage of this commerce that I have provoked the discussion that I hope will follow the reading of this paper. I do not think that landsmen quite realize the havoc that it is possible to work amongst unprepared merchantmen on the sudden outbreak of war, and I scarcely think that the powers that be care to grasp the question. We have arrived at a period of history when the struggle for wealth, both individual and national, assumes vast dimensions. It is all very well for statesmen, living in their ideal world of hatred of war and injustice, to say that war cannot be permitted on the score of its unreason and brutality. Even the most modern history shows us that a firm and prepared front is the best safeguard for peace and its blessings; and the outspoken words of a celebrated Frenchman, that twenty fast and well-found cruizers would ruin the commerce of Britain, is approaching more closely to the truth than is at all desirable from the British point of view. The fact remains that, at the time of the last war scare, there was an utter absence of any information amongst merchantsteamers leaving port about that time, as to what was to be done in the event of war, and, as at present I do not know that we are any further advanced—presumptuous though it may appear on my part to advance theories on the matter in the face of the great authority that recently stated that it was impossible to arrange even a system of signalling between men-of-war and merchantmen—I must, with every respect, confess my inability to see where the difficulty lies, and I think it quite within the range of practical measures to ensure a far greater amount of safety for, or to, our steam tonnage in war-time than it is now in possession of.

Without going into absolutely accurate figures, my statistics, as follows, are taken from the "Statistical Abstract for the United Kingdom for 1887." By that authority I see that the import of grain into the United Kingdom is valued at over 48,000,000*l.*, that various other articles of food, such as meats, both fresh and preserved, cheese, potatoes, and tea, come to another 31,000,000*l.* per annum. That this is a startling fact I think will be admitted when we know that England is victualled for three months at the longest, and when we consider the fair probability of the stoppage of our food supply at the commencement of a maritime war; what would this mean to the enormous masses of the working class, who find extreme difficulty even now in keeping soul and body together? To compare small things with great, what happens if snow delays the ordinary traffic to the metropolis for three days? And what would happen were our grain supply to be cut off even for one month? There would be such internal misery and dissension that one might well shrink from the contemplation of the hideous pictures that ordinary foresight could freely paint. We know the excesses to which a French mob

can run, we lack the experience fortunately of the capabilities of an English one, yet recent Trafalgar Square riots show what excesses can be run to, even under an exceptionally strong government, and it requires no great stretch of imagination to foresee the possibility even in our own time of a repetition of the Commune should the food supply of England once really fall short of the amount necessary to feed the masses of the population as they are fed to-day.

I have found it useful of late years, when thinking over certain things connected with life on board ship, to say to myself, "What is the worst combination of circumstances that can possibly happen?" and, having made up my mind what the worst could be, I have added an *x* to represent the unknown, and then prepared to the best of my ability for what was to come. It is a plan that I think has its merits, for although on suggesting that a certain contingency might arise, one is usually met with the answer that it is very unlikely, the fact remains that it is possible, and so I contend should this same question we are now discussing be looked at.

I spoke just now of a fair probability of the stoppage of our grain supply. Is there a fair probability?

Whatever the relative strength of our Navy may be when compared with that of France, I will assume for the sake of fair argument that it is equal to the combined warships of France and Russia. Not all our Naval experts, perhaps, would admit that it is so. There can be few more difficult questions than the relative theoretical strength of navies or warships, but that is not the point just now. Were we at war with France and Russia combined, what remains to protect our commerce against the dozens of fast raiders that would be turned out in all directions to capture our merchantmen? The "Alabama" was no question of a warship. She was no better able to fight a battle than a very second-rate merchant steamer could now, and she sunk in her first engagement; but she was a raider that destroyed the commerce of America afloat, and drove its trade to foreign flags in such a manner that even that vast self-supporting nation has been unable to regain its place on the sea.

That happened at a time when commerce was small compared with what it is at present, and when speed at sea was not anything near its later developments. These two factors taken together mean an increased rate of destruction in war-time, and the entire captures of the "Alabama" could be easily eclipsed in one week now by one fast and very moderately armed merchant cruiser. This is no question of speculation. We know exactly in which direction our enemy would strike at us, and it would be at our weakest and most vulnerable possession—our shipping. I hear it frequently said that in the event of war our ships are to be transferred to a neutral flag. What is intended by that phrase I fail to understand; scarcely any *collection* of neutral flags could take over our ships and work them; and even supposing such a plan were in readiness, would an enemy of ours respect such transfer? I think not, and even were they to respect the ships, France recently declared rice contraband of war, and so even the neutral flag would be unable to continue our grain supply

under those conditions. But, assuming that this transfer were possible, what is the result? Trade follows the flag, and our ships under a neutral flag would mean simply ruin to England. I cannot conceive anyone calmly contemplating the transfer of our ships to foreigners. Our ships sailed by men of the nation under whose flag they sail, our seamen idle and earning nothing, the shipowners with their realized capital laid up and unable to use it (supposing it were realized), and our *one* big trade gone. I confess to have no liking for the picture. Our stronghold is the sea. We have claimed the mastery of salt water for centuries, and it would be a poor climax now to seek the cover of a neutral flag, and confess our inability to protect our own. Here I cannot resist quoting from a speech of Sir C. W. Wilson, at Bath, 1888, before the British Association:—

“I may add here that if there is one point clearer than another in the history of commerce, it is this—that when a State cannot effectually protect its carrying trade in time of war, *that trade passes from it and does not return*. If England is ever found wanting in the power to defend her carrying trade, her fate will only too surely, and I might also say justly, be that of Venice, Spain, Portugal, and Holland.”

It may be said that the subsidized steamers on the Admiralty List will be quite equal to this work, I mean that of looking after an enemy's raiders. Doubtless, they would be if there were enough of them fairly started with their enemy in view; but this same fair start requires greater consideration than it has yet received.

They could not satisfactorily be taken from their own routes. The want of them would be too surely felt, and the need of them too vital, as I shall endeavour to show later on—and to sum up this part of my argument in a few words, there is the commerce of England at sea practically undefended: hostile armed merchantmen hastily and perhaps indifferently armed, but flying a Government flag, would take our vessels at a disadvantage (especially Russian cruisers expressly intended for this purpose), and the result would be the disappearance of the British flag as the carrier of the world, to be replaced by the stars and stripes, and Teutonic and Scandinavian emblems.

The foregoing remarks have, I hope, pointed out the necessity for protecting trade at sea on the commencement of hostilities, and the absence of means for doing so at present. There is our Navy; the largest and best steamship company in the world, but still too small for the work it has to do, and so must either take in more capital, or amalgamate with someone that can help the work in hand. Perhaps both courses might be adopted with advantage.

The question as to what would probably happen on all the trade routes of the world, under existing circumstances on the outbreak of war, is far too large to be dealt with on such an occasion as the present. The ocean trade routes of the world cannot be glanced at even, within the limits of this paper. The subject also requires a greater amount of detailed knowledge than I can pretend to bring to it. I therefore propose to confine my remarks to the trade that

would probably spring into existence between the two great Capes and the Channel. But first, I should say a few words on the probable method of dealing with captured vessels—it is a large field for speculation.

In the late Naval Manœuvres it happened that several merchantmen were brought to by cruisers, and captured and released—now what does this mean? It means simply that vessels employed in their peaceful avocations, in utter ignorance of even sham warfare, were stopped by a shot being fired across their bows. So far, the proceedings might have been the same had it been reality; but in place of releasing the captive to pursue her voyage with a mark on her to show she had been taken, what would have happened in actual warfare? What would an enemy have done with the captured vessel? Let us assume her to have been a P. and O. ship with a large crew and a number of passengers. I will suppose her to have a crew of 120 men and 200 passengers, and that four days' fair steaming would take her into an enemy's port, either one side or the other.

In all the discussions which have cropped up on this subject of merchant shipping in war-time, the Declaration of Paris has always formed an important item of the debate. By many it is looked upon as an unmitigated blessing bestowed on Great Britain—by others it is regarded as a great mistake on our part, and one that should be repudiated without delay. I cannot say that I am of this latter opinion—this treaty, in spite of some alleged informalities, was undoubtedly entered into in furtherance of the interests of modern civilization—it was subscribed to by the Plenipotentiaries of the majority of the Great Powers of the world. But I cannot believe that it was the intention on the part of the representative of Great Britain to place that Power in a far worse position than its neighbours—I say *far* worse, because with a frontier which, for us, is bounded by the farthest shore of the sea, our outposts by the generally understood meaning of that document are to be simply unarmed patrols—that having the eyes to see and the strength to act, they are to be deprived of all or any means of defence, that strong and speedy though they may be, they are to have no refuge, save in flight from the meanest and least powerful of an enemy's vessels, and in proportion to our greater number is the power of a possible enemy to inflict damage which could not be returned by us in similar coin. The worst part of this is, that we should be unable to profit by our national trait of taking the first beating kindly—that meaning that we should cease to be the market of the world, and therefore hopelessly ruined. My reason for these latter remarks will be more apparent as I proceed.

Now the Powers that can fit out privateers are three, viz., Spain, Mexico, and the United States, and it would be difficult to imagine less likely adversaries. Privateers having to take their prizes into port for a legal decision as to right of capture, and the Great Powers having forfeited the right, or rather having given it up voluntarily to fit out privateers, it would be necessary that the vessels preying upon our commerce should possess the licence to sink, burn, or destroy:

and this power is only possessed by a man-of-war or a vessel fitted out by the State with that end in view.

There are three courses open with a captured liner. To send her into port with a prize crew.

To take the people out of her and sink her, or to sink her as she is.

In the first case, what sort of a prize crew would be required? It would need Officers, engineers, and men, and even if every man of the prize crew had a belt full of pistols, to compel the original crew of the ship to work, when away from the guns of the captor they could not do it, unless in fairly strong force, say fifty all told, and that number would be a serious drain upon any ship's company. Could less do it? Knowing something about a ship's engine-room, I doubt it.

A torpedo-boat would be a far better escort, and if the ship were unarmed, would be the best thing.

If again it were proposed to destroy the capture, what could be done with the passengers and crew, including, perhaps, women and children? There are three courses open. To have in readiness a tender to receive them, equally as fast as the captor. To take them on board the captor, a course open to many objections one need not particularize, or to place them in their own ship's boats, if there are boats enough, and turn them adrift. A great objection to all these methods would be the loss of time taken up in pursuing any one of these courses.

In Mr. Kinglake's History of the Crimean War there is a very interesting chapter relating to the *Coup d'Etat* of Napoleon the Third. In it he enters exhaustively on the different kinds of slaughter of non-combatants, as compared with the shooting in Paris on that occasion. I do not find in it any trace of a case similar to the latter one, and it might, perhaps, be fair to assume that to a humane captor, a passenger ship would be a sort of white elephant, if captured when far away from a home port; something may, perhaps, be said on this subject as against arming them, and thus rendering them combatants. But I am afraid that modern warfare will probably eclipse in its rigour anything the world has yet seen, and in the endeavour of an enemy to damage the commerce of England, no consideration of ruth or humanity would be entered into. I hope I may be and am mistaken, but I think that ships would be sunk promiscuously whenever and wherever they were found, and that this would be carried out even by humane Officers as necessitated by the needs of war.

I presume that no probable adversary of ours could fit privateers without our being also able to do so, so that if it comes to arming merchantmen to do duty as men-of-war, we ought to have the advantage.

With the Suez Canal blocked, which is only a fair risk to take into account, and is moreover a probable contingency, and certainly a point for which an enemy would strive, the trade from the East would naturally be diverted to the Cape routes, not even altogether because of the stoppage of the Canal, for it is a question whether fast vessels would not rather trust themselves to the open sea if they were

sure of their coal supply, in preference to narrow waterways like the Red Sea and Mediterranean, unless they were well convoyed. Now we know that men-of-war, even if they could be spared from near home, do not care to keep the sea long, and steam long distances. It is nearly 6,000 miles to the Cape of Good Hope, and how long would it take to get the vessels out there that would be required on the outbreak of war to protect the trade that would centre in Table Bay: if there were war next week, what armed ships are there to protect it? The "Raleigh" and the "Penelope," with a few smaller cruisers. I don't think that the weather on the Agulhas bank would suit any of them very long, and I should say that three vessels of large coal capacity with Réunion or some port in Madagascar for a dépôt or coaling station, could, if sent out by an enemy, have a very pretty hunting ground for their undisturbed amusement for some considerable time. I have the French Messageries mail steamers in my mind as I write, and nothing on the Cape station at present could catch them at sea; so far as men-of-war are concerned, there would be little trouble there on the subject of passengers, and Jack adrift in an open boat would excite no great amount of sympathy; he is used to drowning.

While on this matter concerning the Cape of Good Hope, and the natural convergence of trade to it in war-time, I should point out that from 5,000 to 6,000 tons of coal is the usual stock in the place—the import was 110,000 tons last year, and that only sufficed for the ordinary traffic, so that unless the coal-fields of Natal develop largely, this item will prove a serious source of trouble. The coal import there is largely done by Italian sailing vessels, but as there is little doubt as to coal being contraband of war, I don't see that it would help us much—it would be curious to see Table Bay full of steamers waiting for coal: true, they would be in comparative safety, but what about the people at home who are waiting for the supplies thus detained?

Now take the Cape Horn route and the trade by steamers through the Straits of Magellan: one important item would be the grain from the Pacific ports, the value of which alone amounts to more than 4,000,000*l.* per annum, and is now conveyed to England principally by sailing vessels, but which would, on the outbreak of hostilities, have to be carried by steamers. With the French Messageries steamers running to Rio de Janeiro, by far the fastest vessels on the route, and ready as they doubtless would be on the outbreak of war to take the initiative, what are the means at hand to catch them or hinder them from picking up our sailing vessels and steamers in all directions? The "Cleopatra" cannot be everywhere, and after the "Swallow" is mentioned, the rest of the south-east coast squadron might as well be in Portsmouth Dockyard for anything they could do to protect our ships in that direction, and if they cannot do so, where are the vessels to be sent in a hurry to take up that duty on the outbreak of war, and generally to protect this route? It must be borne in mind that with the Suez Canal blocked, Cape Horn is on the road home for steamers from Australia as well as from New Zealand, and

that therefore the traffic on this route would increase enormously—also that both steam and sail routes from the Horn to the Line are not far from one another, which fact is all in favour of the enemy—also that the remarks as to scarcity of coal supply at the Cape, should the trade increase suddenly, apply with additional force to this route. The Falkland Islands are our only depôt, the stock of coal there is not worth speaking of, and it is a long distance to steam from Australia to Buenos Ayres or Rio. I do not see that the half-dozen fast cruizers now in reserve would be too many to patrol this route, but I cannot resist the idea that they would find their work fully cut out a great deal nearer home, and here I quote words used by Admiral Colomb in this theatre :—

“Is it not reasonable to assume that the 900 steamers in France thrown out of ordinary commercial work by the war would be largely employed for raiding purposes?” He also mentions the 1,800 or 1,900 vessels leaving and entering the British ports daily, and, finally, “it seems as if, unless there are armed ships *on the spot wherever shipping is thickest*, a single raider in the short time at his disposal might do enormous damage.”

I think I have shown that our commerce, as totally distinct from the question of fighting between fleets of battle-ships and the defence of the country itself, is not satisfactorily protected. I should say that the grain trade alone, which would be diverted to these two routes in the event of the blocking of the Suez Canal, would be to the value of 10,000,000*l.* per annum at least. I think it will be generally admitted that we should, under existing conditions, sustain our heaviest losses during the first two months of war, before the vessels we rely upon to run down the enemy's raiders are enabled to arrive at their stations, and this being so, does it not show the necessity of some vessels on the spot being put into some such state of fitness as shall enable them to take part in the forming of convoys and the protection of them to a certain extent, until they can arrive at what may be termed the fighting ground of battle-ships? The mere fact of *any* merchant steamers being selected to carry guns on an emergency is quite enough for my argument. What one can do another can within moderate limits. By this I mean that the difference between the subsidized vessels and an ordinary first-class mail steamer is not such as to vitiate my argument; and even if inferior vessels were used we could afford to lose ship for ship far better than any of our neighbours.

If the control of the highways of the sea is our heritage as we fondly imagine, and we are to retain it, it will not be done by a mere comparative superiority of strength, it will have to be by a decided and decisive one, and unless the fleet of 150 cruizers asked for by Admiral Hornby is to be called into existence, in no other way can it be done than by securing the services of numbers of merchant steamers; scarcely any effort that I could imagine would do so satisfactorily on the outbreak of war with an enemy knocking at many of our hundred gates. With our Navy admittedly far too small for the work it has to do, is it not worth while *now* to commence and see

what can be done in the way of organization and arming of some of the most suitable steamers on the routes of which I have been speaking? It is so easy to do most things if one only has time, but the want of it in this case would be simply disastrous; time meaning leaving the victualling of England to take its chance. Diplomacy has its day, and that day is usually a long one, giving an enemy every opportunity to make sure of our intentions and to be ready as soon as ourselves to endeavour to strike the first blow. What better opportunity could there be than the present to institute these reforms necessary for our safety, and which if taken in hand when any relations were strained with a foreign Power would undoubtedly make matters worse, and perhaps precipitate events which might have been avoided and would perhaps be regretted?

It is now a matter of history that at the time of the last Russian war-scare their cruisers were encountered in the most unexpected places, and the inference is that they will be still better prepared when the inevitable occasion comes. What our preparations were it is needless to discuss; but I presume it is well known that we were anxious to buy and pay double cost price for at least one fast cruiser that could both keep the sea and fight. Now, if it was considered necessary then to invest half a million of money in one solitary instance, would it not be worth while to invest a moiety of that sum in putting some of our own vessels into such a state as should in a great measure obviate the necessity for such a prospective outlay?

Before proceeding further in this matter I should like to state that I do not propose or contemplate a convoy of armed merchantmen without a man-of-war to take charge of them. I should not propose a collection of British ships to afford target practice for an enemy, which might happen if there were no ship present capable of meeting a man-of-war, and preventing a game of long bowls, where the odds would be all against the vessel showing the biggest side. And here I would like to suggest, in the most unobtrusive manner possible, that the length of the cruisers mostly built now for the protection of our commerce is a fatal bar to their efficiency. I should rather say their want of length, for nothing under 350 feet is fit for deep-sea speed.

There was a vessel built some little time since by Lord Armstrong, who is reported to have said that she was more than a match for a fleet of armed merchantmen; of course such an authority is a difficult one for me to question, but I think a little may be said on the other side. Steam is a great leveller of odds at sea, and the stem of a merchant steamer is almost as formidable as that of a man-of-war; there is the force that, properly applied, is capable of sinking any vessel not strong enough to resist it, and I cannot dismiss the idea that a convoy of merchantmen is not to be handled with the impunity which is commonly imagined. There are certain easy formations which could be maintained with no risk to themselves, even by vessels not accustomed to keep station, that would put even an "Esmeralda" in a fix if she ventured amongst them, presupposing there were any shred of organization, which there undoubtedly would be if they ever found themselves in such a position. There is no truer saying, and it

has been applied very closely to naval affairs, than that "History repeats itself," and if a fleet of merchantmen has succeeded in beating off an enemy before, there is at least the inference that it may do so again; but in the notable instance in which it did so, the ships were well organized and disciplined, and this would necessarily be a *sine quâ non* now, and herein lies the great gist of the matter.

Now, if it is said that it is of no avail trying to organize merchant shipping for its own defence or for a certain purpose not immediately connected with its own pursuits, look at the vast strides the P. and O. Company has made lately towards manning and officering its ships with Reserve men. I say *vast*, because small though the actual numbers of the men are, the bare fact of the expression of the wish of the directors of that company has been enough to foster the scheme amongst their *employés*. How or why that wish came to be expressed is a matter unknown to outsiders, but it is reasonable to suppose that the directors of that company did not consider it would be detrimental to their interest as the first mail service of England. Undoubtedly, many vessels of that fleet, other than those on the subsidized list, would have to play an important part in that quarter of the world to which they trade, should war occur. The interests there would be far too valuable to sacrifice by taking the vessels off the route. It would be too fatal a mistake to part with one item even of our trade in war-time that we could possibly retain. And so to return to the Cape route as the one immediately under discussion, I should say that if considerable trouble had been expended on the preparation of vessels to look after themselves and perform some of the work necessary in war-time between the Cape of Good Hope and England, none better could be selected than those of the Union SS. Company of Southampton. Having sailed in them for many years I am fairly justified in expressing an opinion on the matter. What the directors of that company would say to my suggestion as to the use to which it is possible to put their fleet I know not, but I know that if the expression of some wish at headquarters has been enough to influence the P. and O. Company, I do not imagine for one moment that the Union Company would be less willing to move towards their own interests. Were they once convinced that such a course was advisable, no better ships could be selected for the trial of any new plan. They are extremely handy vessels, can average about 14 knots per hour, and sailing from Southampton offer exceptional advantages in favour of the end I have in view. I believe it possible in such a port as Southampton to practically retain ships' companies for years and years together, and I instance this particular company for the reason that it and the Castle Line are at work on the route under consideration. And having suggested the possibility of such use of mail steamers, it somewhat rightly devolves on me to show the practicability of the scheme.

Here, again, comes in history as a precedent: in all our great naval struggles, notably in the case of the Spanish Armada, each port sent out its batch of ships under their own separate organization, and yet capable of working towards one common end.

This matter of the working of groups of merchant or mail steamers is capable of easy solution; any man of ordinary ability appointed to work a group of ships to carry out a well-planned scheme could do it with little difficulty if properly instructed as to the broad outlines of the plan; the appointment would be little different from that of the mail officer or agent of the past. He would know accurately the movements and routes of his own vessels, and where they coincided with those of other lines; and if Marine Superintendents of large steamship companies receive honorary commissions in the Naval Reserve they would doubtless also be pleased to perform any duties which might fairly go with their honorary rank. I have not the least hesitation in saying that the majority of these gentlemen would be the ones to work the plans satisfactorily. Even a small subsidy to the companies concerned would produce the ends desired in the time usually taken by merchantmen to earn their money, and that is the shortest possible. I say a subsidy to lines that are not in receipt of a retainer for their vessels, for it would not be reasonable to expect any company to work, even for the common weal, if they were not paid reasonably for their efforts; it might also well be a matter to be considered in the placing of mail contracts.

I have spoken of the subsidized vessels at present on the Admiralty List being required on their own routes; the North American trade would ill spare its fastest and best vessels under the conditions of modern warfare, still less could vessels on the Australasian lines be taken from their ordinary traffic; the stoppage of trade with our Colonies would be a vast misfortune to contemplate, the exports of food alone from Australia amounting to 3,000,000*l.* in 1886; and part of the enormous grain supplies we receive from North America would surely find its way to England by the fastest vessels procurable.

There is no armament abroad worth the name of such to put into any vessels that may be required on an emergency: a spasmodic attempt was made six years ago to meet the want, with little result, save the water carriage of many obsolete weapons. I do not, however, say much on this subject, as armaments have changed very considerably since I first made any remarks on it, and we must move with the times; but why not try the experiment of putting a decent armament of quick-firing guns into the fleet of vessels I have mentioned? With depôts for ammunition on the route, the matter would be capable of a great facility of working, and a fleet of well-disciplined, sound, fast, and useful vessels is ready, so to speak, constantly.

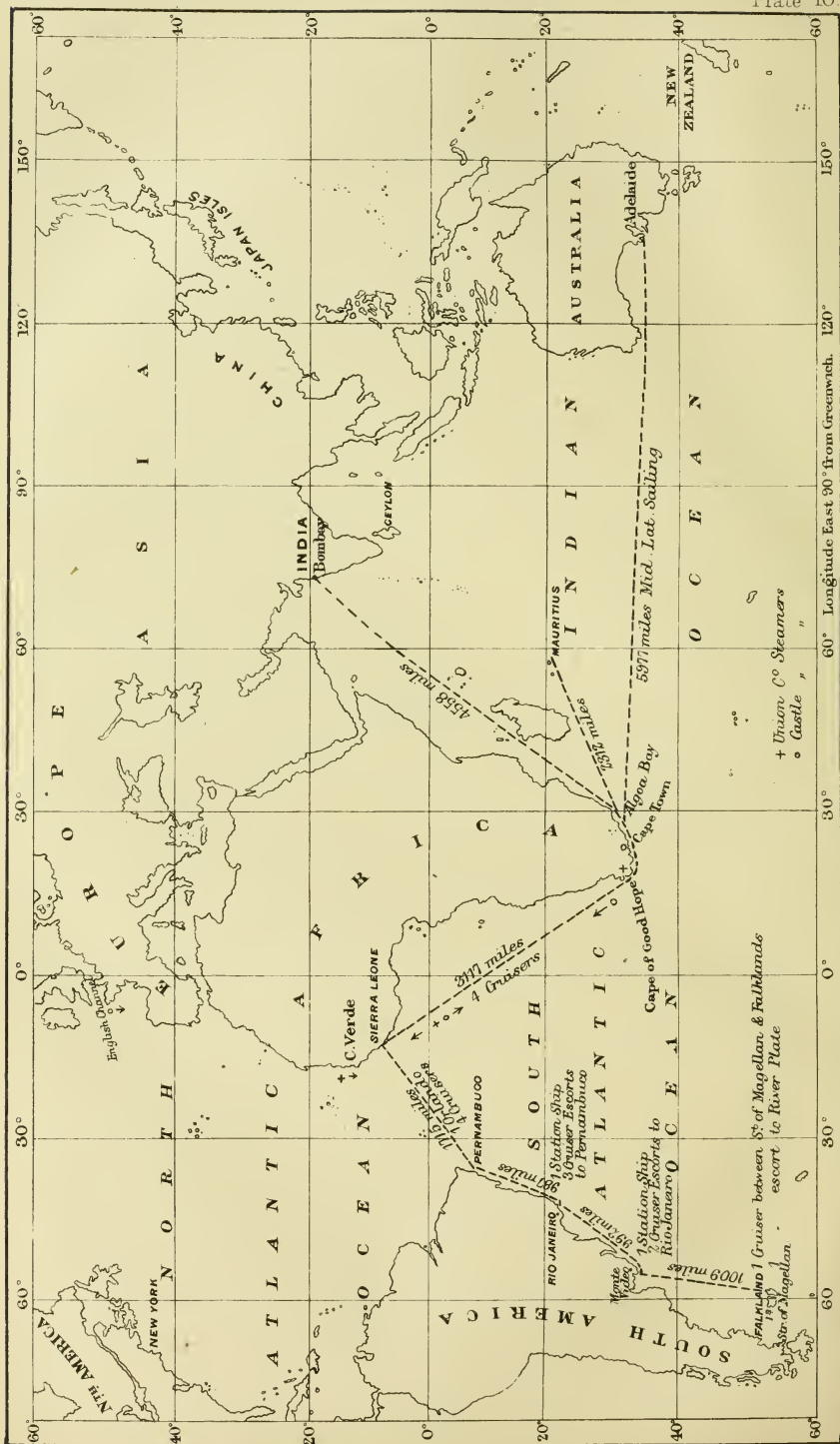
The question of the magazine is, I imagine, the most serious one by far; no large supply of ammunition could be carried owing to the difficulty of port regulations, dock rules, &c., but quick-firing ammunition is widely different from the old system of cartridges and not nearly so dangerous, so that I do not look upon the difficulty as insurmountable—the guns themselves are no obstacle, the great difference of weight between modern and old-fashioned guns having removed one great objection; should any such scheme as this get a trial and prove a failure, the expense would not be worthy of consideration as compared with the great interests at stake, though I do not believe that in the

vessels I have indicated failure would be at all probable, and what can be done in one service can be done in another if it be proved worth while. There has been a falling off lately in the numbers of the First Class Reserve men; there used to be an idea that reserve men were not popular with shipowners, in consequence of their liability to be called upon for service; that is entirely exploded, both in the case of Officers and men, but if this force be worth being taken care of, no better system of encouragement could be adopted than by so arranging matters that the leading lines of steamers should seek to obtain them. I am well aware that nothing is likely to succeed in this commercial age that does not give a fair prospect of gain or advantage to someone concerned in the business in hand; this present matter is an extremely big one, and the bearing of it on the merchant service of England is not seen by all. By no amount of legislation would it be possible to produce the same results from a Board of Trade point of view, as would this scheme were it given a fair trial; it would mean a revision of the officering of the mercantile marine, it would put an end to the very unsatisfactory discussions that wage about superior certificates, and it would produce a class of men that could fight their ships as well as work cargo. In other words, it would mean that the Naval Reserve, in place of being a force costing little and doing a proportionate amount of work for value received, would become to all intents and purposes a reality, it would have arms to fight with, and a coherence that at present it does not possess.

The Volunteers of England are much exercised in their minds now as to their efficiency, should they be called upon to take the field; they want a bigger capitation grant, great coats, rifle-ranges, and many other things that they will doubtless get. But is the danger of an invasion of England to be spoken of in the same day with the extreme peril our commerce is in at sea? Yet this force, the Naval Reserve, which I suppose is intended to correspond to the militia, has, from its very beginning, "been kicked loose and billeted nowhere," and that this is so is, I feel convinced, because people will not look at things from a logical point of view. If we lose our trade and the command of the sea, the fact of an invasion, more or less, will little influence the destinies of England, and all the armed merchantmen we could muster would little avail us without a corresponding increase of our men-of-war on the routes here under discussion, to exercise the superior controlling power and provide anything like adequate protection to the enormous wealth at sea.

In the accompanying map it will be seen that the two routes of the convoys from east and west converge at Sierra Leone, and that eighteen vessels (men-of-war) are required to form convoys, irrespective of armed merchantmen. Of these eighteen, three may be termed station ships, and one should be somewhat after the style of the "Orlando," to remain on that part of the route between Pernambuco and Sierra Leone. I think it would be far better were the same vessels to remain on their own part of the route, which may be divided on the east coast of South America into four portions. I have assumed a speed of 12 knots for the convoy throughout, and my reason for

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saying that the men-of-war should remain on their own position of the route is, that they, not being accustomed to steaming long distances, could not, without occasional stoppages, do the work which is the everyday business of the merchant steamer.

The patrols would be—

From the Falklands to the Plate,

The Plate to Rio de Janeiro,

Rio to Pernambuco,

Pernambuco to Sierra Leone.

Sierra Leone would be the rendezvous also for the Cape of Good Hope convoy, and from that port into Channel they would, of course, require far more careful watching than they have hitherto had. I do not express any opinion on that subject, but I scarcely think that any naval Officer present will say that I have taken an exaggerated view of the needs of these two routes for men-of-war only; even as it is, there are numberless difficulties to be encountered, one of the principal of which would be the coaling of the men-of-war. On the Cape of Good Hope route the convoy would be formed in Table Bay, and there, if it were to be had, the vessels would take coal enough to carry them to Sierra Leone. If private enterprise or Government forethought had not foreseen the want of coal at that port, there they would remain until the necessary supply was forthcoming; but with the south-east coast of America it is different. Between the Falkland Islands and British Guiana, which, for all practical purposes, may be taken to mean the West Indies, we have no port; and whether the Argentine Republic and Brazil would consent to our using their ports as coaling stations for our men-of-war, is a question that may perhaps have to be argued after the event; but if this were so, it would point out that the coaling of men-of-war would have to be done at anchorages on the coast; or else Rio would have to be considered a central point, and Sierra Leone and the Falklands considered as finals. I am under the impression that this, the south-east coast of America, would require a great deal of attention. At a speed of 12 knots, it is six days from Sierra Leone to Pernambuco, three more to Rio, three more to Buenos Ayres, and three more to the Falklands.

The ships on the South-East Coast Station are the "Flamingo," "Rifleman," "Cleopatra," and "Swallow"; on the Cape and West Coast, "Acorn," "Alecto," "Bramble," "Curaçoa," "Goshawk," "Landrail," "Penelope," "Pheasant," and "Raleigh"; and I must leave it to experts to say what would be the value of these vessels if used for convoys.

When I was last at the Cape I got the positions of all the mail steamers, and placed them as shown on the map. It was the 4th of January, and I concluded that if war were declared on that day, by the end of the month Table Bay would be filling up with vessels stuck for want of coal. I do not know whether it enters into the present programme of defence to look after Sierra Leone and the Falkland Islands, but I do not see how they can escape playing a very prominent part in any future naval war if properly utilized. The French had a big coal depôt at Goree years ago. I should say it would be a

very serious thorn in our side if we ever have the misfortune to quarrel with them, and have no similar depôt in the vicinity, whilst the Falklands are simply of *vital* importance to vessels coming from New Zealand and Australia.

I do not know whether my arguments carry any amount of conviction with them. I am so firmly convinced in my own mind of the accuracy of what I state, that I have not, perhaps, sufficiently emphasized detail to satisfy all my hearers, but I do hope that the discussion which follows this paper will help to show that the danger that threatens England is not invasion but the destruction of its wealth at sea.

“STATISTICAL ABSTRACT FOR THE UNITED KINGDOM (No. 35), 1887.”

No. 26 (p. 51). *Quantities and Values Imported into the United Kingdom.*

<i>Corn.</i>	Wheat	55,802,518 cwt.	£21,337,918
	Barley	14,239,566 „	3,761,497
	Oats	14,462,943 „	3,488,329
	Maize	31,167,325 „	7,548,272
	Other kinds.....	6,334,360 „	1,854,868
	Wheaten flour	18,063,234 „	10,027,884
	Flour, other kinds....	895,961 „	272,025
Total of corn		140,965,907 cwt.	£48,290,793
	Bacon and ham	3,927,602 cwt.	£8,733,776
	Beef	874,248 „	1,811,237
	Cheese	1,836,789 „	4,514,382
	Salted and fresh meat.	826,794 „	1,681,116
	Preserved meat.....	520,239 „	1,351,769
	Potatoes.....	2,763,357 „	974,904
	Rice	5,019,512 „	1,873,551
	Tea	221,841,490 lbs.	9,782,998
Total.....		237,610,031	£30,723,733

No. 30 (pp. 70-71). *Quantities of Grain Imported into the United Kingdom.*

Wheat.

From	U.S.A. Pacific ports...	9,978,202 cwt.	£4,014,939
	Chile	2,206,272 „	836,529
	British India	8,511,512 „	3,102,964
	Australasia	1,347,151 „	531,243
	South Africa, British Possessions	49,501 „	18,398
Total.....		22,092,638 cwt.	£8,504,033

“ANNUAL STATEMENT OF THE TRADE OF THE UNITED KINGDOM FOR
YEAR 1887.”

Preserved Meats.

Australasia	167,161 cwt.	£386,810
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Fresh Mutton.

Australia.....	42,445 cwt.	£77,608
New Zealand	395,638 „	841,208
Argentine Republic ..	251,273 „	442,597
Total	689,356 cwt.	£1,361,413

Rice.

Japan	167,799 cwt.	£67,641
Siam.....	39,491 „	13,225
China	26,616 „	13,287
South Africa, British Possessions	250 „	120
Mauritius	19,200 „	6,325
British East Indies ...	4,309,278 „	1,506,200
Total	4,562,634 cwt.	£1,606,798

Coffee.

South Africa, British Possessions	3,087 cwt.	£9,847
British East Indies ...	272,682 „	1,178,150
Hong Kong.....	718 „	2,476
Total	276,487 cwt.	£1,190,473

Admiral BOWDEN SMITH: Mr. Chairman and gentlemen, I think it is a very good thing for this Institution and the country also, when a gentleman of Lieutenant Crutchley's experience comes here to read a paper on a subject of so much importance as this. We are very glad also to see you, Sir, in the chair, for I do not think anyone has done more than you have to bring this subject before the country. It is admitted that the protection of our commerce demands a large proportion of cruisers, and, I think, all our hearts have been recently gladdened by the very excellent, and, I think I may say, judicious shipbuilding programme, which has been put before the country by the First Lord of the Admiralty, and which has already practically passed the House of Commons. Unless, however, we have our organization complete, and make preparation for war in time of peace, we shall not get the full benefit out of these cruisers. There is a subject in connection with this matter which was touched upon by Lieutenant Crutchley in the first part of his paper, which I think of great importance—I allude to the question of communication and signalling during war between our cruisers and ships of the mercantile marine and between one merchant ship and another. I do not think that this question has been sufficiently considered at present. We heard last year that Lord Charles Beresford was about to bring forward some motion on the subject of signalling, but owing to the great demand on the time of the House of Commons, he was unable to do so. Of course we all know, all who are accustomed to the sea, that we can communicate with each other at present during the day time with flags, by the International Code-book, but there is no means whatever of communicating

at night. What does that mean? It means that during war-time one of these magnificent steamers that Lieutenant Crutchley has been talking about may have some valuable information to give to one of our cruisers, or a cruiser may have some very important communication to make to her, and neither can do it unless they lower a boat or approach within hail, which is not always an easy matter. Our possible future enemy may be kind enough to involve us in war during the summer when the days are long and the nights are short; but on the other hand we may be dragged into a war in winter when, as we all know, on some dull days, we could have no communication with each other between 4 o'clock one afternoon and 7 o'clock the next morning. Many Officers in the mercantile marine have thought about this, and two or three gentlemen, considering that our system in the Navy is too difficult and complicated, have sent up some plans to the Board of Trade for night signalling, and it has been my good fortune to have to look into those plans and report upon them. I examined them carefully, and came to the conclusion that they were certainly not so complete as our system, and were not more easy or more simple; but I would not trust to my own judgment only, and, therefore, put myself in communication with the Flag-Captain at Portsmouth, and asked him to be kind enough to give me the opinion of his Signal Staff. I sent these proposals to him, saying, "Please put aside every prejudice, and tell me if you think they are workable, and if they are more simple and more easily learned than our own." He replied that they were workable, but that they were not more suitable and not more easily learned than our own. So I came to the conclusion that if any system of night signalling is introduced, it must be the Morse system. When I say the Morse system, I mean the system we use in the Navy, and which was first introduced by my friend Admiral Colomb. We know that it is to him that we are indebted for having first introduced this flashing system of night signalling into the Navy. Now, I wish to point out to gentlemen of the mercantile marine the advantage of this Morse system. The only apparatus necessary is a lamp with a shutter or slide, which will cost, perhaps, 45s., and a steam whistle, which is already fitted to every steamer. There is no code-book required, and signalling can be carried on under any circumstances, by night as well as by day, and in fog as well as in clear weather. It would require a trained and qualified signalman in each ship to work it; but why should not our large steamers carry one qualified signalman? I do not for a moment suppose that night signalling could be carried on in our sailing ships or smaller steamers; but if the Admiralty and the Board of Trade would give their sanction it might be introduced into our large mail steamers, such as those of the P. and O. line, and the magnificent ships that cross the Atlantic. They might, perhaps, if it were authorized, provide themselves with a lamp and allow one quartermaster of each ship to be trained and requalify once a year, as our Naval Reserve men do. We might then have a system of signalling between Her Majesty's ships and the merchant service, and in the merchant service itself between one ship and another. If this system were once introduced it would probably become popular. When I was in the "Britannia" a few years ago, we rather went in for the use of the semaphore as well as the Morse, and I was surprised to see the way the boys took to it. I used to see them in the boats and in the cricket field making signals to one another with their arms. I believe, that if this system were introduced into the mercantile marine, it would grow; young Officers would learn it, and it would be taught on board the "Conway" and the "Worcester." The Morse system now holds the field, but if anyone can propose a better and simpler plan I hope he will do so.

Admiral Boys: I want to ask the lecturer one question with reference to the route between Sierra Leone and the Cape of Good Hope. He has not mentioned either the islands of Ascension or St. Helena. St. Helena is a coaling station very fairly fortified, and perhaps the lecturer will presently give us the reason why he has omitted it. A curious circumstance happened to me only yesterday before seeing or hearing this paper. Captain Crutchley says history repeats itself; I saw yesterday, in a shop window, an old print of two ships, which attracted my attention; it represented a British brig being captured by a French privateer. The privateer had lowered a boat; the brig was to windward; the brig put her helm up, ran clean into the privateer, carried away her aftermast and sails, got clear, and

away she went and left the privateer to look after herself. That seems to me a condition of events that might happen again, especially when two or three vessels are together, and it bears on the paragraph in the paper in which Captain Crutchley points out that the stem of a merchant ship is nearly as formidable as that of a man-of-war, and that a fleet of merchant ships have beaten off an enemy before, and the inference is that steam would give a better chance now to do it again.

Captain NOEL, R.N.: I wish to bring two important questions before the meeting. The subject of this lecture is the unprotected state of British commerce at sea, and I presume that what we are to consider is how the commerce is to be best protected. I think the first thing we want to decide—as a great naval nation—is to what extent must an armed merchant ship receive the authority of the Government in order that it may act as a war-ship without infringing the maritime law by which privateering is abolished. That must be an exceedingly important question. Supposing, as Captain Crutchley observes, that we did allow our merchant ships to carry armaments, is it possible when they are abroad for them to receive authority sufficient to enable them to act as ships of war? The next question is, to what penalty, if any, a captive merchant ship would be liable if her capture were resisted by force of arms? I think that these two questions are of great national importance to England, and of such great importance that it is very desirable that the Government of the country should get a full and thorough understanding of them from other nations. I do not propose to go into the paper more fully. I appreciate and admire the way in which it has been put before us. It is most clear and concise, and thoroughly to the point; in fact, it is one of the most valuable papers on naval subjects that we have had in this Institution for a long time.

Captain PENROSE FITZGERALD, R.N.: Lieutenant Crutchley makes a sort of apology in the first paragraph of his paper for bringing forward the same subject on a third occasion. When I was coming down here, before I had seen the paper, although I guessed what the nature of it was, I was making up my mind that I was going to pat him on the back and thoroughly encourage him in hammering away. If we want a subject brought before the public it is no use stating it once and then dropping it, and I was rather afraid when I heard the last paper that that was what he meant to do. We see the principle of reiteration adopted to enforce all sorts of fallacies and falsehoods, I might say, “in another place,” if it is not actionable, and I do not see why the same principle should not be applied to truth, and to a patriotic course like this, until he insists upon his countrymen taking it up and looking at it. We hear the Irish question and various other fads hammered at until we are sick of them, but here is a point which is vital to the existence of the Empire, and what I say to Captain Crutchley is: do not make this the last time; go on until you make them listen to you! There are several controversial points, but really the general tenour of the paper is so entirely to the point that one does not like referring to the points that one does not entirely agree with. There is, however, one point about the Navy. He says: “All the discussions which have taken place lately on the subject of our Navy have, as far as I have seen, been solely confined to the ability of our men-of-war to meet successfully those of our possible antagonists; the protection of the greater part of the commerce of the world has not been touched upon.” I am afraid people will get into the fallacy of saying that *besides* providing a sufficient Navy to meet the enemy, you must have protection for your merchant commerce. Now if there is nobody to attack your commerce you do not want any one to defend it. If your Navy is sufficient to not only crush the fighting ships and the regular cruisers, but also the auxiliary cruisers and similar vessels, that settles the question. If there is nothing to attack you, you do not want any protection. I refer to this point because it is the one logical argument of the opposition. I think he made a most admirable allusion to the food supply when he said: “To compare small things to great, what happens if snow delays the ordinary traffic to the metropolis for three days?” We know what happens. Distress of all sorts. That is a very concise and admirable way of putting it, and I hope, whatever other part of the paper is published, that they will publish that. I had the honour yesterday of reading a paper very cognate to this subject at the Naval Architects, and I quite agree with the lecturer in saying that these large Atlantic cruisers which have been subsidized by the Admiralty will be wanted

for their own trade routes, and we shall not be able to use them as war cruizers at all. They will be required to use their enormous tonnage to carry cargo, and to carry whatever to us will be most valuable: it may be coal, perhaps, to different stations. I think it probably will be coal, to fill up those unsupplied depôts which Lieutenant Crutchley so graphically brings before our minds, at the Cape of Good Hope and the Falkland Islands, and other places. I should think one of the best things to do would be to fill the "Etruria" up with coal and send her to the Falkland Islands. It sounds a big order, but it would seem to me to be the most valuable thing to do with her, because for ships of that tonnage to be simply used as protecting cruizers would appear to be an utter misapplication of their capabilities. I think he made a mistake in referring to the "Alabama," because, as far as I know, she only captured one steamer, and we must look for the sailing ships being laid up. He says: "I hear it frequently said that in the event of war our ships are to be transferred to a neutral flag." I am very glad he brought that point forward. It has been set forth, I think, by no less authorities than Lord Brassey and Mr. Forwood. It simply means suicide; it would be the end of the whole business: the British Empire would cease to exist. If you cut your throat, what more do you want? If your trade is transferred to a neutral flag you must give up business; it is strangulation, that is the end of all things. I hope the papers will put that down. Then with regard to the Declaration of Paris. It has been touched on several times in this theatre, but it has never been thrashed out. I do not see Mr. Baden-Powell here to-day. I should like to hear him again on the subject. Admiral Colomb mentioned Lord Thring yesterday at the Naval Architects, and the mere mention of the name so frightened Lord Ravensworth that he shut him up, and would not let him pursue the subject; the very name of Lord Thring was sufficient; he would not let him say a word about international law. It should be cleared up, though, one way or another, before war breaks out. I remember on the last occasion Lieutenant Crutchley asked, in a pathetic manner, what was to become of him if he was found fighting, whether he was to be hanged, because, he said, as a matter of personal interest, he would like to know: and I dare say he feels it quite as much now. The doubtful point should be cleared up. I do not know whether Captain Crutchley can explain this sentence: "There has been a great falling off lately in the number of First Class Reserve men." I wonder if he can give us any explanation of that. I think it is a terrible pity if that be the case, and there must be some reason for it, and I do think that they ought to be encouraged to the very fullest extent possible. With reference to Admiral Bowden Smith's observation on signals, it seems to me to be the very vital essence of the thing, and that his proposition is eminently practical, to get one man who can work the semaphore or the Morse code in each ship, and then to allow the system to spread, and it would be, I believe, as he says, contagious; the men would soon pick it up, and I have no doubt if it were once started in the merchant service, Captains passing each other on sea routes would signal to each other all sorts of interesting news, either with the whistle, the semaphore, or the flashing light, as the case might be. If it were once started they would use it, and the benefit of it when war came would be simply inestimable, because they would be able to communicate direct with every man-of-war they saw, and to give them information which might be of vital importance to the nation. A system of signalling, so simple and yet so comprehensive, would form the strongest possible connecting link between the two Services, and its value in war-time would be inestimable; but this, and all other organizations, must be completed in peacetime.

Rear-Admiral P. H. COLOMB: I should like to add my mite to what Captain Fitzgerald has said, and to hope that Lieutenant Crutchley will not drop this subject, but will go on hammering away until he gets it right. We have to recollect that, after all, this question has been debated in our country for a comparatively short time in our own day. I think the Chairman began it something like twenty-three or twenty-four years ago. We have been more or less hammering at it ever since, and I suppose in twenty-three or twenty-four years more, if we continue hammering, the question will be understood. The whole of our naval position is usually misunderstood by the ordinary Englishman, and I might give you a couple of anecdotes of what occurred to myself recently as a proof of what I have just

said. Last year as a part of the scheme we were then getting up, and which has produced such excellent results, I wrote to the London Chamber of Shipping and said to them, "I do not think the shipowners as a rule understand the difficulties they will be placed in in war; if you can get me an audience of shipowners, I shall be happy as far as my humble powers go to help you to consider the question, which is an important one." The answer I got was that an audience of shipowners could not be got together to consider that question, the season was against it. I waited until the season had changed, and I wrote again and said: "As the season has changed, perhaps you could get an audience to consider the question of whether you are going to retain your ships in war-time or to lose them;" and the answer I got back was—and it was a very remarkable answer, I think, I keep it carefully by me—that "I was a little mistaken as to the nature and office of the London Chamber of Shipping, that it did not only, as I seemed to suppose, represent the shipowners of London, but that it consisted of delegates representing the ship-owning body over the whole kingdom; and that, therefore, I must see that it was not the sort of body which ought to be addressed on the subject I proposed." Now, I will give you another anecdote. I read, as I suppose a good many of us do, much of what is said by the Press all over the country on the subject of defence, and amongst the articles a fortnight ago or thereabouts was a long one from the "Scotsman" discussing some of these questions, using my name and quoting me as having said certain things. The certain things I was quoted as saying were to my mind the greatest nonsense; and I was somewhat nettled at having such words put into my mouth. However, I sat down and wrote a long, and as it was characterized, a very "stormy" letter to the editor of the "Scotsman." I attached a piece of paper saying I presumed it was too long and too stormy for publication, but there it was. However, the editor put it in, and added a paragraph at the end of it. My letter explained some difficult questions of naval policy, and amongst them the question we have before us to-day. The editor added a paragraph at the end of it, saying that he had received great punishment for the small offence of misapprehending what I had said; that it was a very stormy letter, and really after reading it carefully, he was quite unable to make out what it was the gallant Officer meant; "but," he said, "after a little time we will endeavour to deal with this stormy letter." In a little time, in three or four days, there appeared a leading article, declaring that my letter was the most lucid description of naval policy which they had ever read. That is to say that my words, you see, fell at first upon absolutely blank minds; and Lieutenant Crutchley must understand that his words when they go out to the general public in England fall at first upon absolutely blank minds, and there is nothing to be done that I know of except to go hammering and hammering until those minds get sufficiently receptive to understand what it is you are talking about. Captain Fitzgerald dealt, I think, almost sufficiently with one point of criticism that I picked up, that was the apparent supposition that war-ships as built at present were not prepared for the protection of our commerce; that they were prepared for contending with the ships of the enemy, but that in some way they were disconnected with the defence of commerce. Now, my opinion is as to the new programme of the Government, that no person acquainted with what would have to be done in war, who studies it, can doubt that that programme has been drawn up directly and distinctly in view of the protection of our commerce. The classification of the ships, the numbers of the ships of the different classes provided, were quite enough to convince me at any rate that the protection of our commerce has been in the mind of the Government, and that the Government have at this present moment something approaching to regular plans which they never had before for the real protection of our commerce in war. I think Lieutenant Crutchley may consider that his former papers on this subject have helped that, and that this paper will still further assist it. The loss of the food supply is of course always touched upon, and we find in the country that question is again very much misunderstood. When we speak of "starvation" in the technical sense, it is held that what is meant is absolute starvation, an absolute stoppage of the food supply into this country. I am quite sure none of us mean anything of that sort. We know quite well that there is always such a thing as breaking blockade, and that it is almost impossible to cut entirely off the exit and entrance of ships from any port.

But this is what we do mean, that if it happens that our ships have not free passage over the sea, two things will come about: there will be a shorter supply of food in this country in consequence of a less quantity coming into it, and the price will certainly rise far above the natural level due to that circumstance. Also, this is quite certain, that at the same time as you lose your full supply of food you will also lose your full supply of raw material. How are you situated under those circumstances? Food has run up in price, labour has necessarily gone down in price. Are we wrong when we used the word "starvation" to imply that condition of things? I do not think we are. I very much agree with what the lecturer said as to the doubt that exists in our minds whether, even in the case of these subsidized steamers, it will be possible to remove them from their ordinary routes. I greatly doubt it. I think that they will have to be utilized in some way over their ordinary routes. As to dealing with captured vessels, I think that the lecturer rightly classifies the different methods of dealing with them; and then I think we may go back to history to see pretty well what would happen. The old privateer always brought out a number of spare crews on purpose to put them on board the captured vessels; and although we are not allowed to use the word "privateer" now, although the ship which will do the same or worse work as the privateer did will not be called a "privateer," yet I have no doubt whatever that this commissioned ship will take with her a number of spare crews. And then you must recollect that if one of these small vessels makes a capture of a big ship, such as the lecturer has spoken of, that will be sufficient for her purposes; that one big prize will mark the success of her cruise; she will be ready to go back into port again after having made that great capture, and I conceive that generally speaking the practice must be to put crews into the steamers when captured, and to endeavour to get them back into port; not only because of the value that is saved to the captors, but also because every steamer captured from us which goes into an enemy's port may come out of that port commissioned as a man-of-war and raider for the purpose of adding to the mischievous fleet which is troubling us. I will now state what I had not the opportunity of stating yesterday at the Naval Architects. Lord Thring in this theatre, a couple of years ago, in discussing an analogous paper to this, distinctly said that there was no question whatever about the right of a merchant ship to defend herself; that a merchant ship had a right to defend herself against capture by an enemy, precisely similar to that which any Englishman has to defend himself against a garrotter or burglar. Of course I quite agree with Captain Fitzgerald and Captain Noel that it is most important that this very elementary question should be laid down as settled by authority. I must confirm Captain Fitzgerald also about the "Alabama." I think if more than one steamer was captured by the "Alabama" there were very few. This much is certain, the "Alabama" made nearly all her captures not under steam but under sail, and it was because she made them under sail that she was able to have such a long life of it. Other Confederate ships which tried to make captures under steam soon expended their coal, and then disappeared into ports from which they never came out again. As to the transfer of the flag, we had that at the Naval Architects only yesterday. Here the question is raised again. It is quite forgotten, as the lecturer has so ably put it forward, that there are not flags enough to hold our ships, not nations enough to take them up. If you look into the law of transfer of the flag, as laid down by the international lawyers, you find that the conditions are very difficult to get over on the part of our shipowners, who think so lightly about the transfer of the flag. What it means is that they are going to sell their ships at a sacrifice, and never get them back again. There is one point which I believe is quite certain as regards France, which is the country after all that we have most to think about. France I have very good reason to believe is admitted by international law to be able to sustain the position that she will not recognize any change of flag which takes place after the declaration of war. So where are you? I, in common with previous speakers, would like to know more as to how it is, and to what extent, the Naval Reserve is said to be falling off. I have the highest possible opinion of the Naval Reserve, and I am sure we rightly rely upon their help in war-time. I should like to see their numbers greatly increased, and I think it is quite possible that a second-class reserve may come out of the failure of our attempt to work the defence of our shores through the volunteers. I take it that it is very likely that through

some second-class reserve that may be better effected. Perhaps I may be excused for adding a word upon the subject of signalling, which has been mentioned. I would like it to go forth through the Press that I am pretty sure that we should have had the flashing system in common use in the mercantile marine some time ago, had it not been for the direct interposition of the Board of Trade. Nearly the whole of the steamship companies of Liverpool at the time when the distress signals were changed, and when difficulty in the mercantile marine arose in consequence—the greater part of the steam shipping companies in Liverpool, on my moving, applied to the Board of Trade to be allowed to use that system to distinguish themselves at night, and to communicate amongst themselves, and the Board of Trade gave a distinct refusal.

Admiral BOWDEN SMITH: The Board of Trade are now willing that they should do so.

Admiral COLOMB: I am very glad to hear it. It ought to be known that we could have had the thing moving now, had it not been for their direct interposition. I was unable to ascertain the reasons for this forbidding, for it was a direct forbidding of the companies to use it. But after some months when I was beaten, and had lost, as it were, interest in the subject, permission was given. But the thing had passed, and I could take no further steps about it. I think that Admiral Bowden Smith is perfectly right in going for what is called the Morse system. The Morse system is simply the application of the flashing system of signals with the Morse alphabet instead of the figure signs which we use in the Navy.

Admiral BOWDEN SMITH: Did use.

Admiral COLOMB: Do use with the signal-books. It is a different system of notation, that is all that it really comes to. The fact that there is a difference of notation apart from the Morse system rested first on the form of our signal-books in the Navy, and secondly upon the immense difficulty of getting the Navy at that day—twenty-eight years ago—to understand what it had got before it. It would have been impossible then to have induced the Navy to adopt the Morse notation with the flashing system, it was hard enough to get them to adopt a notation which was very much more simple. But time has gone on, and for ten years past I have urged that the time was come for abolishing the original system of notation in flashing signals both by day and night, and fully adopting the Morse notation. And the signal-book in the mercantile marine lends itself directly to this, and almost compels you to adopt the Morse notation. I feel quite sure from what I hear that some of the larger steamship companies are almost on the point of moving for themselves in this matter, and that the very slight encouragement which they are now getting, and which I hope will be continued, will induce them to adopt it. I quite agree that as soon as the thing is started, it really is so simple and easy, it will grow. The fact that the Morse notation is used for nearly all telegraphic messages and all telegraph work makes it all the more easy to establish in the mercantile marine, and its already being established in the Navy gives a further advantage to it. In time of war the fact of the mercantile marine being able to communicate with one another and with the shore, for that is most important, at considerable distances by night and by day, and also in fog, all of which are to be done by the flashing system, is one the importance of which cannot be exaggerated. I am very much obliged to the members for the attention they have given to me.

Sir J. C. D. HAY, Bart., K.C.B.: This very excellent paper which Captain Crutchley has put before us requires very little explanation to make it clear to any one of us, but I am particularly anxious that in his reply he should make it apparent to those outside this theatre, as it is entirely apparent to those within it, that these suggested lines are merely a very small fraction of the lines which would have to be protected in case of war: that, as a matter of fact, they are but two lines out of at least six important lines which it would be necessary for the Navy to protect, or on which it would be necessary that merchant steamers should be armed. Captain Crutchley should also make it apparent to those who may read the paper and may not have heard, or seen the map which he has produced, that the illustration given of these routes depends upon the closing of the Suez Canal, which he anticipates may possibly occur, and I trust it may occur, for it would be greatly to our advantage if the Suez Canal were blocked in war. In such an event, a large proportion

of our commerce would come upon these routes. But with regard to these routes I should like to say this: Captain Crutchley appears to assume that the River Plate, Rio Janeiro, Bahia, and Pernambuco, would be open to our commerce. My impression is, Brazil being neutral, and looking to recent interpretations of contraband of war, they would not be so open, and the commerce coming through the Straits of Magellan from Australasia or the Pacific would have no place to call. Sandy would be closed in the Straits of Magellan; the Falkland Islands are not protected; Berkeley Sound is not in the scheme of these harbours to be protected and protected coaling stations. It would therefore be necessary, in my opinion, for that route which Captain Crutchley suggested, along the east coast of South America, to be diverted either to the Cape or to St. Helena. The Cape is about to be pretty well protected. St. Helena, which has been mentioned as having been omitted, but which, no doubt, Captain Crutchley will refer to in his reply, may be rendered impregnable, and may be looked upon as a rendezvous, not only for vessels passing round the Cape, but for those diverted through the Straits of Magellan away from the coast of Brazil to the protected stations on the route homeward. Sierra Leone no doubt is in process of being made very strong; I believe the fortifications are planned, and some of them are commenced, and the guns are about to be made. But it would not be a very pleasant place for all the fleets to rendezvous. Good though the harbour is, as we know, the climate is not the most salubrious. It seems to me that the route which is described on that chart is not a route which could be adopted, in consequence of the absence of coal supply and of the fact that there is no pretence whatever to fortify, protect, or hold the Falkland Islands. There is another most useful coaling station, but it is not to be protected. I allude to Ascension, a most valuable place, which, of course, may get into the hands of a privateer or a foreign Power with great facility. With regard to the question of armed merchant ships, there seems to be a general belief that these merchant ships are very fast, that they are faster than any possible enemy who would presume to interfere with them, and that it would be a case of bolting all over the world, and that there is to be neither convoy nor protection necessary. I recognize the great speed of these vessels, and I myself would be in favour of convoys under numerous merchant ships, partially armed in the manner suggested by Captain Crutchley, guarded and protected by men-of-war capable of steaming as fast as they. But that appears not to be a plan which commends itself generally to the public mind, and I fear we shall lose many single ships unless some means be adopted to give the merchant ships that protection which, in my opinion, I believe they are fairly entitled to, use to defend themselves against all evil-doers. The question is, where are you to get the guns? Captain Crutchley, perhaps, can tell us. I remember when, more than twenty years ago, it was intended for the first time that merchant ships should be taken up for the assistance of the Navy in war-time; it was then proposed that a certain number of guns should be made and put in stock for the purpose of arming them. Many merchant ships have been fitted for the purpose, but the guns are not yet made, and it has been twenty-two or twenty-three years, I think, since that order was given. The privateers which we have to fear, I think, are not entirely the privateers of the Powers with whom we might expect to be at war. I believe there are other enterprising nations who would lend themselves to that particular business, who would require flags which might be valuable to them, and having got those flags there are other nations which have not themselves entered into that most wretched and disagreeable Treaty of Brussels, who would perhaps rather go to war than not defend their subjects if they were successful in the art of privateering. I should be glad to hear from Captain Crutchley, like many of my brother Officers, if he could state why it is that the First Class Naval Reserve is no longer so popular as it was. Is it that the regulations under which the men are accepted are too stringent and higher qualifications are expected, or is it that trade being better they find employment elsewhere, and do not care for the fee which they get to bind themselves to this country?

Admiral Sir E. OMMANNEY: As a naval Officer it is most gratifying to hear from so competent an authority as Captain Crutchley on matters concerning the mercantile marine the views which are entertained by that community on the very important points contained in this valuable paper. I am much struck with one proposal

regarding the armament of great ocean steamers, namely, that they might be fitted with the power of ramming an enemy. I think this is a very practical and simple suggestion, and one which could be carried out in the construction of these splendid vessels without entailing any serious expense on our national companies, and would involve no interference with the arrangements and qualifications of these vessels; as they are driven with such a prodigious velocity they would then be provided with a formidable weapon of destruction upon warships of inferior speed. As an old signal Officer I am pleased to hear that the means of signalling by night between the Navy and mercantile vessels is being organized under the auspices of such a very competent and experienced Officer as Rear-Admiral Bowden Smith.

Captain CURTIS, R.N.: I might suggest, with respect to the relief of these captured vessels, or what is to be done with them, there is another way of redeeming them. The "Alabama" released several of her captured vessels upon their Captains giving bonds, and I believe that those bonds were all honourably met. That would be in great favour, I think, with the crews of the ships. I do not know whether it would be legal or politic on board a man-of-war or not. We are often compared to a fortress in war-time, shut up, and liable to be cut off from our supplies.¹ I never heard it suggested anywhere that we should have three months' corn stored in the country; in Gibraltar and Malta they have a year's store of grain. It might be met in this way, by the Government giving a bounty to merchants or paying them some money for keeping so much corn stored. Captain Crutchley said history repeats itself. Lately I read the history of the old East India Company's service. Whenever our vessels were in a minority our seamen and merchants always suffered, and we lost the Moluccas in consequence; and when Oliver Cromwell took matters into his hand he made the Dutch pay 250,000*l.* compensation for the maltreatment of our merchants and men. With respect to coal, Captain Crutchley said our vessels might use Rio Janeiro. I believe, from what I can learn of the matter of coal, if an English man-of-war puts into a neutral port, that neutral port will only supply them with coal to go to their next coaling station, and they cannot use that coal for war purposes, unless in self-defence. I believe that is correct. There is another point that Captain Crutchley has not touched upon, and that is the route from the Falklands' to Vancouver. Vancouver is getting a very important place, and I suggested to one of the late Commanders-in-Chief on that station that it would meet the approbation of his countrymen if we could get one of the Galapagos Islands, and I believe Chatham Island is a very suitable point, being equidistant between Falkland Island and Vancouver, in a straight line, about 7,000 miles. That group belongs to Ecuador. Ecuador is not a very rich country, and 50,000*l.* might buy one of those islands, and any vessel rendezvousing there—for instance, if you had no coaling station you could put your ships in between the islands, and a man-of-war at either end would prevent any ship attacking them. I did not understand exactly what Captain Crutchley meant by arming merchant ships. I presume the Government would never put arms on board merchant ships unless they thought they were authorized to use them.

NOTE.—Albemarle Island is 4,700 feet high: a good look-out could be kept from there; the islands are in a very commanding position.

The CHAIRMAN (Sir J. Colomb): Before asking the lecturer to reply to the questions that have been asked, I may be permitted to add to the general chorus of approval expressed, not only of the paper but of the persistency of the efforts of the lecturer. It has been pointed out that the people of England are, in spite of this Institution, in spite of many able voices that have been raised, still blind and deaf to the real gravity of this whole question. I think this Institution is also to be especially con-

¹ Page 338, Whittaker:—

Value of wheat and flour imported for 1887....	£31,365,802
Value of three months' supply	7,841,450
5 per cent. interest	392,070

compensation for money dormant the merchants would receive. I think it would, if war were likely to occur, be wise to have six months' stored; it would not amount to $\frac{1}{2}$ *d.* in the pound income tax.—J. D. C.

gratulated that an Officer of the mercantile marine of practical knowledge, of practical experience, and at this moment closely and absolutely connected with it, comes forward to give us his views upon this most important question. I think the matter would have been very much better advanced years ago, if the mercantile marine had had more Officers who not only thought of these things but were good enough to come and give the naval Officers and the experts who meet here, an opportunity of hearing their views and of having that joint consultation which is necessary for the organization and protection of the commerce of the Empire. I take the grand lesson brought before us in this paper to be, in the first place, that our huge commerce is almost at the mercy, as far as any means of defending itself goes, of improvised raiders under other flags, and that it brings before us this great fact, that practically nothing has been done with regard to the real organization of the means it offers for assisting the Royal Navy by its own protection to a certain extent, and that nothing whatever has been done by this country either to suggest a scheme or to work it out. I do trust and hope that this paper, seeing the marked approval it has met on all hands, will, as my brother said, have a direct bearing and influence upon the Admiralty, and I hope that one of the matters that it will make the Admiralty reconsider is their present programme of subsidizing the best of the mail steamers for the purpose of removing them off the lines in time of war. I took a very strong line in that matter, because I moved the rejection of the first vote, having ascertained in the House that the Admiralty did intend to remove them from the lines in war; I moved the rejection of the vote, and stated my reasons for considering that the plan was bad in theory and would turn out bad in practice. And I might mention, in order to emphasize what the lecturer has said, that there is another point to be considered in removing these steamers from off these lines. Our commerce may be grouped into two classes—the steam commerce and the sailing commerce. I do not speak of it, for I think we are all tolerably agreed upon this, that war means the extinction of the sailing commerce, and therefore it is only necessary, as practical men looking at it from a practical point of view, to consider the steam commerce. Well, now that may be grouped into two great classes, the regular liners, trading regularly between fixed points, and what may be called the all-round trade, and of course there are difficulties connected with organization for protection of the all-round trade that do not present themselves in the case of the regular lines. Now the most important lines are those lines that connect our own Empire, and those are the lines that, unless you are prepared to lose that Empire, must be maintained, and not merely maintained by the Royal Navy but the actual traffic between these different parts of the Empire must be kept going. What happens when you remove the best ships? Take India, take the P. and O.: the proposition is to take the best of the P. and O. ships off the lines on the outbreak of war, and to pay them in peace to enable you to do so. When war comes, when carrying out that policy of removal off the line, it will be a matter of the most vital importance that your direct communication should be kept up, and both as regards the actual value of the trade and the rapidity of communication that will be a pressing necessity in war. What are you going to do? You are going to take the best ships off the line, those ships that possess the quality that gives the greatest safety to a merchant steamer, that is her speed. You are going to take the fastest ships off the line on purpose that when the hour of peril comes the remainder of the line shall be in extreme danger. And you do more than that: you send up the price of freight on that line, because you at once raise the insurances. You are defeating your own object, and for this reason, you take the best ships off the line: you force your mails, your passengers, perhaps your troops, your valuable cargoes, your specie, everything into slower ships, and in proportion—I think it is quite obvious—to the speed and power of the merchant steamer, so will be the insurance risk. Therefore I do trust and hope that coming from a man of practical experience like the lecturer, being backed up by the naval Officers as he has been on that point in this theatre, the paper to which we have listened to-day will certainly put a nail in the coffin of a policy which we cannot look at without dismay. To give you another reason. The P. and O. lines to India, the “Union” and the “Castle” lines to the Cape, the New Zealand lines, all these are subsidized for keeping up the internal postal communications of the Empire. How has it come about that they

are so good and have such magnificent ships? It has come about in this way, that the necessities of your position in peace demand it. They have been subsidized and assisted by mail contracts. These mail contracts—take the case of the Cape or India or Australia, whichever case you like—these subsidies are joint subsidies made up of contributions from the mother country and your Colonies and possessions, which they connect by their operations of trade. And I am quite certain of this, that when war breaks out, though the Admiralty may have paid during peace for the right of taking them off the lines in war, the Admiralty would not be able to do it for this reason, it would be breaking faith with your own Colonies and dependencies at the hour when they most require their mails, passengers, and trade services best performed, and you propose to cripple them all by removing from their lines their fast vessels. What are you then to do instead? I agree with what is indicated in this paper. You must deal with the mercantile marine in groups. The organization of your mercantile marine for the defence of your Imperial routes, connecting your own Empire, must, I believe, be your first care. You must deal with companies as you now deal with the individual ships. The “Castle” or the P. and O. and all the other companies must understand that when they get a postal contract it means they are to run in peace and in war, and further it means that it is the business and duty of the Admiralty so to promote and foster the growth of organized fighting efficiency of the various companies’ fleets as far as can be done without undue interference with trading requirements, that they shall be as it were an armed fleet in war, carrying on the communications of the Empire, and also running down the lines of the all-round trade by sometimes perhaps a little diversion from the ordinary route. That appears to me to be the true policy, and the policy which I hope, by the persistent efforts of the lecturer and such speeches as we have heard to-day, may at last be forced upon the mind of the Government. The lecturer has said, “I cannot conceive any one calmly contemplating the transfer of our ships to foreigners.” I will emphasize what my brother said with regard to the apathy of shipowners. I heard the Vice-Chairman of this very Union Shipping Company in the House, within the last few days, calmly indicating to the House that it was preposterous and absurd to suppose that you could protect your commerce in war. No doubt, in his ignorance, he believed that, and has quoted the “Alabama.” Well now, I think that people quote the history and the results of the cruise of the “Alabama” without really having thoroughly studied the question. I think the lesson to be learnt from the career of the “Alabama” and the American War is a very remarkable one, and a lesson we may well take to heart—the want of appreciation of the American Government at the outbreak of war, of what naval war meant. You may remember that on the outbreak they called together a sort of council of eminent men of New York to ask what should be done for securing the blockade of the Southern States, and this council suggested that if they had thirty ships they could blockade the whole coast of the South. In a very short time, however, it was found they could hardly, with improvised war vessels, do it with 600. But the other lesson which is to be learnt by the “Alabama” is simply the lesson which is largely indicated by that very chart of the lecturer’s, and those who have read and studied the cruise of the “Alabama” will find that her success, as Captain Semmes himself points out in his book, was due to the fact that the Navy Department of the United States knew nothing at all about their business. I should like to quote a passage from his own journal. He writes about the despatch of vessels to catch him, and he says, writing in his journal at sea in the West Indies, “The enemy has done us the honour to send in pursuit of us the ‘Powhattan,’ the ‘Niagara,’ the ‘Iroquois,’ the ‘Keystone,’ and the ‘San Jacinto.’ Not one of these vessels ever caught her, although there were several others looking for her;” and then he explains the reason: “The Mona passage being the regular track of the U.S. commerce, it was looked upon as almost a certainty that at least one cruiser would be stationed for its protection.” But there was none. And then Captain Semmes, writing just off Pernambuco, says: “Where can all the enemy’s cruisers be, that the important passages we have lately passed through are all left unguarded?” And then he finishes off: “The sea has its highways and byeways as well as the land. . . . If Mr. Wells (Secretary of the Navy Department) had stationed a heavier and faster ship—and he had a number of both heavier and faster

ships—at the crossing of the 30th parallel, another at or near the Equator, a little to the eastward of Fernando de Noronha, and a third off Bahia, he must have driven me off or greatly crippled me in my movements. A few ships on the other chief highways, and his commerce would have been pretty well protected. But the old gentleman does not seem to have thought of stationing a ship anywhere.” The whole lesson of the “Alabama” is this, to exercise our intelligence and our forethought to recognize the real work you would have to do in war, to utilize our resources in every way, and proceed in the manner and direction indicated by this paper; and as to our commerce being swept from the sea, I for one do not believe it, unless we are unworthy of the trust imposed upon us.

Lieutenant CRUTCHLEY: There are one or two points upon which questions have been asked me. The first one is that matter of night signals between vessels at sea. I do not think, myself, there would be the smallest difficulty in introducing them into the merchant service, and I feel convinced it could be done with very little trouble, but at the same time, if these Morse signals are introduced it would be as well for vessels on the long routes to have paper sealed books, for which I asked in my last paper. There would be no more trouble in using them in war-time than in using the ordinary books. My reason for not mentioning St. Helena as a coaling station was because, if you look at the distance between Cape Horn and St. Helena, there is a very great difficulty—the difficulty as between St. Helena and Rio and the Falklands. Vessels coming from Australia would have too far to steam, and that was the reason I omitted it. Of course it would be of use for vessels between Table Bay and Sierra Leone, but I do not see that it would be practical to make one convoy if St. Helena were made a rendezvous, in other words, for the ships to come from Australia *via* Cape Horn to St. Helena, and join the Cape ships there; it would be too far to steam. Captain Fitzgerald supposes that if our Navy is increased it will be able to cope with all the enemy’s war-ships, so that there will be none left to harry our commerce. If other nations are to be bound by the Treaty of Paris with ourselves, and unable to carry guns and unable to fit out their merchant ships, there would be no necessity for us to do so, but it appears to be assumed, and I think we are fair in assuming, that foreign nations, France, for instance, would not consider herself hampered by the Treaty of Paris, and they would undoubtedly fit out their faster vessels with guns in such a manner as that they could harass and catch ours.

Captain FITZGERALD: Are we to understand we are to be bound by the Treaty and others not? I cannot accept that.

Lieutenant CRUTCHLEY: The French mail steamers undoubtedly have privileges denied to our own. They claim the right, in the Australian ports, of men-of-war, and they have it, so that when I ask that these mail steamers of ours should be armed and put into a condition of defence, as I have said several times, it is not any question of their contending as men-of-war, but simply putting them into a condition to enable them to meet vessels of their own class on equal terms, and I think it very hard to see that there should be a one-sided game, and that these vessels should have privileges which we have not.

Captain FITZGERALD: Does not your R.M.R. give you the same authority to fight as a Frenchman?

Lieutenant CRUTCHLEY: I think it does; I do not think there is any doubt of it, but the fact remains that these Messageries steamers have rights which are denied to us. As to the falling-off of first-class men of the Reserve, I am unable to give any reason for it, but that it is so I have on very good authority. I think if some effort were made to encourage the Reserve, the thing would be altered. Seamen have deteriorated in many respects and are not as well qualified to maintain their rating as they were; they cannot do the old tricks of sailing in the way they were done twenty years ago, they have not the training, but they are as good Englishmen now, and as good for the work they have to do, as ever they were. I have heard people say there is a prejudice against carrying Englishmen in their ships, and they prefer foreigners. I can only say, from what I have seen of Englishmen, I have sailed with English crews under the Blue Ensign for the last twenty years, I have had no trouble worth speaking of: they have always done their work well. Sir John Hay spoke as to where the guns were to come from that were to be supplied

to these vessels. In the year 1863 there was a circular issued by the Admiralty that they were prepared to supply guns to vessels of a certain size if the owners would guarantee to build magazines and keep things in proper order. I tried to work on that end to see if there was anything to be got out of it, but every one has forgotten all about it. But if they thought it was necessary to do it at that time, I think it may be found necessary to do it now, and I think from four to six quick-firing guns should be supplied and put in vessels on these long routes. In conclusion, I have only to thank you for your very kind reception of my paper.

The CHAIRMAN: I am sure you will all heartily agree that the lecturer deserves a most hearty vote of thanks.

THE COLUMN *v.* THE LINE AS THE FORMATION FOR MOVING RESERVES IN THE INFANTRY ATTACK.

(N.B.—Written before the issue of the new Infantry Drill.)

By Captain H. J. CRAUFURD, Grenadier Guards.

THOSE who were present as spectators at the great German manœuvres last autumn must have watched with keen interest the system of infantry tactics there practised, a system widely differing from our own on more points than one.

The division of the attacking force into fighting line, supports, and reserves is much the same as with us. The fighting line moves forward in extended order, greater attention being paid to correct alignment and interval, and less attention to cover, than is the case in England. Behind the fighting line come the supports followed by the reserves, first the smaller regimental reserves, then the greater masses, brigades and Divisions intended to overwhelm the defence, and by sheer weight of numbers to bear down all opposition.

Now these supports and reserves, be it noted, instead of advancing one behind the other in successive lines as is the custom in England, are moved in column formations, not in large columns, but in compact little masses. The supports are in company columns, that is to say: the three divisions ("zugs" as they are called) into which the company is divided, moving one behind the other at about five paces distance.

The reserves following the supports are in somewhat denser formations, generally in line of company columns at close interval. The great reserves in rear follow in column likewise.

This column formation is not only used when at a distance from the enemy, but it is maintained up to the very last, and the reserves sometimes do not deploy, even when the fighting line is reached, but advance to the assault in company columns.

On seeing these methods, so different from our own, two questions at once force themselves on the mind.

1st. Why do the Germans prefer the column to the line for moving their reserves forward to the attack?

2ndly. Given that these reasons are sound for them, do they apply with equal force to us?

Dealing with the first question, viz.:—the German preference for the column, we know that, taking all other things as equal, the column is infinitely preferable to the line as a formation for the easy movement and direction of troops. There would be no question as to its use always for the movements of reserves and of all bodies of infantry not at the moment required to use their rifles, if it were not that a

column when exposed to aimed fire is much more vulnerable than a line, and that troops moving in the compact column formation would therefore suffer more severely than if they were extended in line.

To us in England this question of losses on the battle-field must necessarily have great weight; to the Germans, however, and other Continental nations having vast numbers of trained soldiers at command, this point has not the same importance. It is not so important as is the absolute expediency of rapidly crushing the enemy and extracting terms of peace, which may, with the least possible delay, relieve the nation from the immense strain entailed on it by the mobilization of well-nigh the whole of its male population.

Hence, in the case of Germany, the question of losses must give way to the importance of employing formations by which their troops may be pushed forward to the attack with ease, rapidity, and in numbers sufficient to bear down all opposition. The column certainly better meets these requirements than does the line, with, however, one important proviso, namely, provided that the greater demoralization caused by the larger losses in column does not outweigh the moral and material advantage which the compact formation possesses for leading men forward in the face of danger. In other words, provided the extra danger be not sufficient to outbalance the extra power of facing danger, which is inherent in a body of men moving in a compact mass under the effective control and influence of one leader.

The Germans have evidently decided that their men can be led nearer to an enemy in column than in line, that the element which we may call *power of command* (or putting it otherwise, *driving power*), afforded by the column formation, will, in spite of greater losses, succeed in carrying the men further in the face of danger than the element *greater safety to life*, which is the attribute of the line formation; hence the adoption by them of tactics which, to English notions, appear to be uselessly murderous.

Are they right in their choice?

This question their next campaign alone can answer decidedly, but a little consideration will show that there are several points, on which we have not yet touched, which tend in favour of the column tactics; tend rather to remove the great objection to them that they will afford so good a target for the enemy's fire that men will not be got to face the danger.

Let us examine these points with a view to discovering whether the danger of the column is really so great in practice as it seems to be in theory.

Firstly, an attack we are told should always begin by an artillery duel, and the infantry should not advance to assault the position until the guns of the defence have been completely or almost completely silenced. Under such circumstances the attacking infantry advances without molestation by artillery fire, and artillery is what columns and all close masses have most to fear. Granted then, that generally speaking, there will be nothing or next to nothing in the shape of artillery fire to be feared by the attacking infantry, and we find one great objection and danger in the column tactics removed.

Another point in favour of the column is this, that as the crisis of the attack approaches, the attention of the defence will become more and more absorbed on the front line of the attackers, and consequently the great majority of shots will be aimed at the firing line, and not at the reserves coming up behind; these reserves can therefore advance in what formation they like with almost equal safety, and the truth of this stands out more forcibly still when it is remembered that the dense smoke caused by the firing line of the attack will certainly hide to a great extent, if not entirely, all the troops moving behind it. No doubt most of the bullets fired at the front line of attack will miss it and pass on as ricochets or otherwise towards the reserves, but it is quite possible that if those reserves are moving forward in a number of small columns, they will actually be less exposed to this description of fire than would a succession of lines. The reason is this, that, taking as an illustration any one bullet among the thousands passing through or over the front line of the attackers, that bullet is surely more likely to find some human body obstructing its path if the ground in rear is, as it were, striped by a series of lines coming one more or less closely behind the other, than if that ground is dotted over by a number of small columns at more or less wide intervals apart.

This leads us to the most important point of all, and one that should have an increasing weight in the future with the ever-increasing velocity and consequent flatness of trajectory of bullets fired from improved rifles.

Supposing now the reserves to be moving in successive lines, they will be gradually getting closer together—each gaining on the one in front until, as the moment of the assault approaches, the distance dividing them will perhaps in the case of the two foremost lines be, say, 100 yards, while those in rear will be at a somewhat greater distance apart. Under these circumstances, supposing the case of the ground being either level or falling at a uniform gradient, the low trajectory of the bullets from modern rifles would probably ensure almost every bullet hitting somewhere in the lines—either directly or by ricochet.

It is obvious that a badly-aimed shot fired at troops advancing in a succession of four or five lines, one behind the other, though missing the line aimed at, is very likely to strike one of the lines in rear; but a bullet fired at troops advancing in columns, if it misses the column aimed at and goes over it, is not likely to find another column in its track for, for obvious reasons, columns would avoid following each other. In the latter case it may be urged that a column is so easy to hit that it cannot well be missed. This of course is true enough when circumstances admit of accurate aiming, and in any case against a big deep column, a formation which no one, under any circumstances, would advocate in the present day; but in the fever of the last moments before the assault, it has been found that men take indifferent aim and generally fire too high, and so a small short column—such as the Germans use—could very easily pass on compara-

tively unharmed by the hurried inaccurate fire of the defenders.¹ The bullet then which fired against columns misses its mark and goes over the column aimed at, is less likely to find anything in its path in rear, than is a bullet which misses its mark against lines, for behind every line other lines are following, whereas the columns naturally avoid following each other.

In fact every improvement in rifles, tending as it does to flatten the bullet's trajectory and so to lengthen the space over which in its course it travels at a dangerous height from the ground, strengthens the argument in favour of employing small columns for bringing up the reserves rather than lines.

Against accurately-aimed rifle fire, or against artillery, these arguments do not hold good, as the column then affords an easy mark; but, as before urged, few attacks will be made until the guns of the defence have been silenced, and the infantry a good deal shaken, and as the attack approaches, the fire of the defence will be concentrated on the first line, and will probably be inaccurate and out of hand.

In conclusion, as the last of the considerations which tend to lessen the disparity between the exposure to losses in column compared to that in line, we may mention that it is probable that an attack by columns can be got over the ground a good deal quicker than can a series of straggling lines, which means of course that in the column attack the men would be a shorter time under fire than in the line attack.

It will be remembered that the question which we set ourselves to consider first was whether the objections to moving reserves up in column, namely, the additional liability to losses, and consequent deterrent effect on the men of the fear of death, are so great that the manifest advantages of the column formation for command and movement must be thrown over in favour of the safer and less exposed line formation.

In the light of the various considerations we have just been examining, what answer are we to give? May not the danger to life entailed by the column tactics compared to the line, in view of the ordinary circumstances of the attack, have been over-estimated? Though the line may well be the safer formation, still in practice, when the attack is considered in the light of human nature, the disparity between the two formations as regards exposure is considerably less than it appears to be in theory. Are we, for the sake of saving a few lives, to willingly throw over all the advantages that the column offers for leadership and command.

A column can be led forward and guided into the firing line at a point desired, so as to fill a gap, or strengthen a weak place, or

¹ Captain Mayne in his "Fire Tactics" says, "But with such fire (*viz.*, very rapid fire) we must consider the excessive fatigue that it causes, the right shoulder becomes bruised and very fatigued by the recoil, and the muscles of the arms and shoulders, especially those of the left arm, become unsteadied by a sort of nervous trembling; the rapidity of fire quickly diminishes, notwithstanding any muscular efforts, which tend still more to weaken the firer, and so takes from his fire any kind of accuracy, that the best shot would miss a battalion column at 100 yards under such conditions.

reinforce a portion of the line that has suffered unduly and seems disinclined to advance, this in itself is an advantage difficult to overrate. Compare this to an advance of successive lines, unable like columns to thread their way through broken ground and so get concealment and cover, but advancing perhaps by alternate rushes, an operation very likely to result in great confusion, one portion of one line overtaking and getting mixed up with the line in front.

It is quite right, of course, that the advanced force leading the way in order to prepare the attack by fire should be in line extended, just as in the storming of entrenchments in the Peninsula Napier tells us that skirmishers preceded our storming columns to keep down the enemy's fire. But necessary as the leading line is for the development of fire, why should the troops in rear who cannot fire move in lines; may it not be because of an umpire-bred system of tactics developed on the manœuvre ground, where speculation of loss is all in all, and the moral difficulty of getting your lines on is nil, as they have nothing to fear from blank cartridge?

If the Germans, with their admirable simplicity of drill and rapid system of training, do not like to trust themselves to moving their men in line, how can we have confidence in being able in war, with ranks filled with recruits and reserve men, to do better, our drill being more complicated and taking longer to acquire?

Is it wise to sacrifice all the great advantages of column tactics on the theory that the loss they will entail will be disproportionately great, a theory which, supposing the arguments already given are sound, is a theory only and not true in practice?

In the latter periods of the 1870 campaign, we find the French unable to move their newly-raised troops otherwise than in columns. In the campaign of Belfort, the repeated attacks of the French, against Von Werder's position on the Lisaine, were made in dense columns, too huge and unwieldy certainly to be anything more than gigantic targets for the German fire. Still they found columns the only possible way of getting the men on at all. Had their organization admitted of their splitting their force up into small columns, each under efficient command of an intelligent leader, trained to this system of attack, the result of those three days' fighting, in spite of the rawness of the troops, might have been very different. The column system must depend upon using small columns, allowing of mobility and presenting a small object for fire. The column should be reduced in size as far as is compatible with efficient leadership.

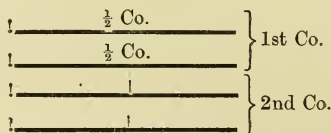
Do we in England, if I may venture to criticize, sufficiently consider the auxiliary forces in framing our system of tactics? In the event of invasion the Militia and Volunteers would have the principal part to play. Is our present system of attack suitable to them as well as to regular troops? The experiences at Belfort just quoted, and every page of military history, teach us that only the most highly-trained troops can be successfully moved in line on the battlefield. Napoleon himself found, in his later campaigns, that he had to incline more and more to compact formations, in order to move his recently recruited and half-trained armies.

If goodwill and courage could do everything, our Volunteers and Militiamen would be equal to any task, but no amount of goodwill can make up for the system and routine which, in course of time, soaks discipline and the spirit of submission to his Officers into the regular soldier, nor will courage in individuals accomplish victory on the battle-field, unless the system of tactics and training adopted enables the commander to apply his forces and guide his men in the way he wishes.

Will it be possible to maintain this all-important control over roughly trained troops, such as are our auxiliaries, if they are spread over the battle-field in a series of loose lines? May not the conclusion force itself on us that our present tactics admit of amendment, and that we should be ready, at least in the training of our Volunteers and Militia, to advance to the attack throwing forward a firing line to prepare the way, but following up with the main forces in small compact columns?

As regards the size of the columns, the Prussians, as they get into the zone of hot fire, split up their troops into company columns, that is to say each company, 250 men or so, is moved with its three "zugs" in column. These can be quickly deployed and welded into the firing line when it is reached. Probably we in England would find half-battalion quarter columns the handiest, the Majors being in command, and Lieutenant-Colonel superintending and giving a directing impulse to the whole. Such a formation would fit in well with our present organization. The half-battalion column would be handy and easily moved and deployed.

If it is objected that this column is unnecessarily and dangerously large, then an alternative in the form of double company quarter column of half companies might be adopted.



In war the question of deployment on reaching the front line will not trouble us much. By the time the column has reached the front line it will probably be only a shapeless lump of men, but it will be a lump and not a straggling string of individuals, and the lump will be marching forward, which is the chief point, imbued with the confidence which a united movement of a concentrated body of men gives to each individual of its body, and submissive to the will and direction of its leader.

With how much greater confidence will that leader take his men into action, all of them in hand and under his eye, than if they were strung out into a long line, out of reach of voice and beyond the influence of example?

The Journal

OF THE

Royal United Service Institution.

VOL. XXXIII.

1889.

No. 149.

Wednesday, May 1, 1889.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B.,
G.C.M.G., &c., &c., Adjutant-General to the Forces, in the Chair.

FORTIFICATION AND FLEETS.

By Major G. R. WALKER, R.E.

Major G. R. WALKER, R.E.: May I be allowed to preface my paper by a brief explanation? After I had undertaken to prepare a paper on this subject, and before I had time to complete it, Admiral Colomb read a paper in March,¹ which seemed to me to change the aspect of affairs very considerably. Admiral Colomb's paper left me in this dilemma, that if I did not take any notice of it, but read my paper according to my original plan, I could only have done so from two considerations: the first, that there was nothing in Admiral Colomb's paper to answer, which, of course, was absolutely precluded by the Admiral's ability and weight in all matters of this kind; and secondly, the conclusion that must have been come to if I had merely read an abstract paper upon fortification without noticing Admiral Colomb's arguments, would have been that there was no answer to them. I, therefore, felt bound to answer, as far as in me lay, Admiral Colomb's objections to fortification, as I imagine them to be. But in doing so I have been obliged to cut out a very large part of the original paper, and, I am afraid, to curtail it in a very unsatisfactory way, and especially I have been obliged to leave out all reference to some modern scientific improvements, in their bearing upon fortification, which I was very anxious to mention: two especially, position-finding, and the introduction of pneumatic guns—position-finding, more particularly, because, in a recent paper in this theatre, it was very incorrectly described, and I thought it would be well, perhaps, to say a few words about it.

ENGLAND is the only civilized country where, at the present time, it is possible to stand up and to deny, with any chance of acceptance, the utility of permanent fortification. The discredit which in this country alone attaches to this, one of the most useful subsidiaries of defence, is due to our insular position, and to the very widespread superstition which exists amongst Englishmen that the sea alone is a sufficient defence, and that they can, in consequence of their separation by the sea from the European Continent, look down in selfish complacency upon the struggles and sacrifices of the less favoured nations who are cursed with land frontiers.

¹ "On the Relations between Local Fortifications and a Moving Navy" (see Journal, No. 147, page 149, *et seq.*).

This unreasoning dependence upon the protection afforded by the accident of insularity may possibly be traced to our great national poet, whose sentiments colour largely, though often unconsciously, much of the popular thought even of our own day.

The well-known lines—

“This fortress built by Nature for herself,
Against infection and the hand of war;
* * * *

This precious stone set in the silver sea,
Which serves it in the office of a wall,
Or as a moat defensive to a house,
Against the envy of less happier lands.”

echoed as they have been by many subsequent writers, are probably largely responsible for the fact that the average Englishman looks with suspicion, the unreasoning suspicion of ignorance and prejudice, upon those who feel it to be their duty to enlighten him as to the real nature of the dangers to which the country is exposed, and as to the folly of trusting exclusively to the maritime frontier for defence. But though this popular ignorance is no doubt widely spread, I hardly expected to find Admiral Colomb appealing to it in his letter to the “Times” (11th March, 1889), with the time-worn platitude “Britannia needs no bulwarks, no towers along the steep;” the alternative being of course the wooden walls.

In fact, says the gallant Admiral, Britannia rules the waves, and in his paper lately read in this Institution, he asserts that there is consequently no fear of any territorial attack, not only on the shores of these islands, but even on any part of the Empire, and in his character as advocate he goes so far I think as to attempt to show that we may dismantle our fortresses as being useless, though he shrinks apparently from the further deduction drawn by General Erskine from his paper, that we should also disband our land forces.

In his general reply to the discussion on his paper Admiral Colomb, as I understood him, withdrew so far from the position which he had assumed in order to invite discussion, as to admit the usefulness of fortification within certain limits, and only to object to its employment on a large scale. He did not, however, define the amount of fortification which he would admit, except in a rather vague and unwilling concession of “light batteries” for the commercial ports. But his concessions in this theatre seem to me completely revoked by his letter to the “Times” of the 11th March, in which he says, “the discoveries of science and the fluctuation of opinion have been fatal to fortification;” and in an able leader in the “Times,” on the morning after Admiral Colomb’s lecture (1st March),¹ we find all his arguments pushed to their logical conclusions, with the inevitable result plainly stated in these words, viz., “Every penny spent on fortifications before our Navy is made strong enough to take and keep command of the sea is a penny wrongly spent, to say the least, if not absolutely thrown away.”

Again, Professor Laughton, in the “Morning Post” (9th March),

¹ See Journal, No. 147, page 149 *et seq.*

enforcing Admiral Colomb's arguments, accuses those who took part in the discussion on Admiral Colomb's paper, especially the military Officers, of having misunderstood him so far as to believe he wished to leave our ports undefended, whereas, he says, Admiral Colomb only contended that they should be rightly defended, *i.e.*, by ships. But that there might be no mistake as to the meaning of his paper, Admiral Colomb, in his letter to the "Times" already quoted, institutes a comparison between ships and forts, to show that the reverse of the commonly received opinion is true, that ships last from generation to generation, while forts have to be pulled down about every twenty years, to make room for their successors; this, broadly stated, is the gist of that letter.

Now putting aside all fine distinctions, the broad meaning of all this is, that until our Navy is strong enough to take and keep command of the sea, not a penny is to be spent (there is the kernel of the whole matter) on any subsidiary such as fortification; and that means, if words have any meaning, cease even to maintain your existing works, and above all do nothing to increase their efficiency, as to do so will cost money which might otherwise be spent on the Navy.

This is the broad issue, and in support of his contention Admiral Colomb brings forward many arguments, appealing chiefly to history. Now this appeal is perfectly just; the principles of strategy are universal and unchanging, but it must be accompanied by a fair consideration of the fact that even in the sphere of strategy the changed conditions lead to some alterations, not in the eternal principles, but in their application under given conditions.

On page 5 of his paper, Admiral Colomb says: "Steam and electricity have everywhere replaced uncertainty and chance by certainty, and have immensely shortened times and distances as measured by times;" but he has omitted a very important point, which has a large bearing on the question at issue, *viz.*, that they have also greatly increased the frequency of the *necessary* communications with the base, both for the supply of coals and for refitting. This omission is, I think, a fair example of the half truths by which Admiral Colomb's arguments are sustained.

Admiral Colomb, in his paper, maintains the following propositions, *viz.* :—

1. That at the commencement of a war the superior naval Power takes command of the sea, and that she never loses this command at any time or in any place during the struggle. Wherever an enemy's squadrons appear they are at once confronted by a superior force of the superior naval Power, and instantly driven back to the cover of the land forts, which are admittedly useful to the inferior naval Power.

2. That no enterprise against an enemy's territory or fortresses is possible within 700 miles even of an inferior hostile fleet, and that such enterprises must always be abandoned if there is the least chance of the loss of command at sea.

3. That a fortified base confers practically no advantages upon a

fleet, either in the way of freeing the fleet for offensive operations at sea, or of facilitating its refitting.

4. That the possession of maritime fortresses follows the command of the sea.

5. That fortifications have never resisted a determined attack from the sea.

And in his letter to the "Times," quoted above, he adds a rider, viz. :—

6. That ships are long lived as compared with land works, and therefore more economical.

I shall now endeavour to meet these contentions in detail.

1. The assumption as to the command of the sea involves the attainment by the superior navy, *at the outbreak of war*, of a condition of comparative superiority to all other naval Powers which is perfectly Utopian. It is undeniable that if the British Navy be so strong that it can watch every possible enemy with a superior force, protect every port and every trade route over the whole surface of the globe, chase and bring to justice every "Alabama" that may break loose from any neutral port to prey upon commerce, and do all this with a force which shall provide ample reserves against every casualty caused by the manifold dangers to which the complicated modern war steamer is exposed, then Admiral Colomb's argument is unanswerable from the military point of view; everything has been done, therefore nothing remains to do. But the question would even then remain, is this the most economical method of doing the work? Certain duties of local defence of depôts, arsenals, &c., have (I assume for the present) to be performed, and to perform them efficiently in the absence of local defence, some portions of the superior fleet must be detached as permanent local guards for these ports. It is not necessary to argue that for such purposes the defence could be more economically carried out by coast defences; even Admiral Colomb's strong supporter, the "Times," says (30th August, 1887): "Ten or twelve guns can be mounted, *even in War Office cupolas*, for less than the cost of a single ironclad," and "these guns would render the Mersey or the Clyde secure at a fraction of the cost of defence by a fleet." Truly "a Daniel come to judgment."

I know it will be objected, but we have, *ex hypothesis*, command of the sea, and we need not therefore detach ships because every squadron of the enemy will be opposed by a superior British squadron, and therefore if he appear before a port for the purpose of attack, the superior British squadron will be there for defence, and until the enemy's squadron appears, the port may be left to itself, for there is no one to attack it. Now if this be true, it is true of Portsmouth or Plymouth or Malta, as well as of the ordinary commercial ports, and all such naval arsenals may be left undefended; indeed the gallant Admiral in his paper, in putting the imaginary case of the appearance of an enemy's squadron off Plymouth, expressly asserts that the fortifications are perfectly useless, and that even without them the place would be unassailable, because of the flanking fleet off Brest.

Now let us look at some facts: there is, I presume, no doubt that

England had the undisputed command of the sea after Trafalgar, and up to the end of the war: "In 1810 we had 664 cruizers at sea as against 105 in 1887, and though 19 of the enemy's cruizers were captured in less than a month, still in one fortnight, 20 British ships were captured by the enemy close to our coasts."¹ Where were our superior fleets; why was there not a superior force present on every occasion to save these British ships? Simply because it was an utter impossibility, even for the large number of ships we then had at sea, to be everywhere, even over the comparatively limited areas then to be watched and guarded, and how much more would that be the case to-day? Admit even the inadmissible, that the British squadrons are sufficient to watch all the enemies' fleets; that they are impervious to all attacks by any possible enemy; that for once in war the unforeseen shall never happen, that the weather shall be as complaisant as the enemy is weak; that there shall be no dangerous rocks, no hidden shoals, no earthquake, no hurricane, no worn-out boilers, no broken down machinery; admit, in fact, the impossible, and still what remains? Why that even by Admiral Colomb's own admission, the sea will be covered with the enemy's cruizers which cannot be restrained from taking the sea and doing mischief, and as a necessary consequence that every important base and every naval arsenal, if left undefended by fortification, will have to be watched and defended by ships told off for the purpose and chained to the port. Because I assert that Admiral Colomb's assumption that such cruizers would not attack undefended ports for fear of interruption, is altogether untenable.

He says, in the imaginary case of Plymouth quoted above, that the dread of interruption would prevent an enemy from sailing up the harbour and destroying the dockyard, even though there were no fortifications; but this makes surely too great a demand on our credulity; naval history may answer "No," but what would be said by his superiors to a naval Officer in command of a powerful modern cruiser, with all the means of destruction at his command, who should refuse to strike such a blow as the destruction of one of our great naval arsenals for fear of interruption? Steam gives certainty; quite so. It would give this Officer just a certain number of hours to blow in dock gates, burn the dockyard, and the certainty of being able to leave again, bar accidents, just in time. The matter is hardly susceptible of further argument; it is a practical question, which I rejoice to think has been put out of the power of an enemy's cruiser to decide against Admiral Colomb, by the common sense of our rulers, who have fortified Plymouth.

But let us look outside the British Isles and the narrow seas: the British Empire is scattered over the habitable globe, and if reasons have been given for refusing to believe that even the most powerful fleet can ever keep the coasts of the home islands entirely free from the enemy, how much more will it be impossible to protect every depôt and dockyard throughout the world.

¹ Admiral Colomb, in "Manchester Courier," 3rd December, 1887.

We have been considering the question hitherto on the assumption that we have the command of the sea, to the fullest possible extent to which it can be assured, by raising our fleet to the position of superiority demanded by naval Officers, but let us descend into the region of practical politics, and ask what this fleet is, to which alone we are requested to entrust the safety of the naval arsenals and dépôts. Why by the confession of the Admiralty itself, a sum of about $12\frac{1}{2}$ millions must be spent, in addition to the usual estimates, within the next four years, not in order to create an ideal navy, but simply to bring the Navy up to a condition to enable us to fulfil the *minimum* requirements in a war with any two naval Powers. In other words, the Navy is at the present moment short of a large number of ships to the value of $12\frac{1}{2}$ millions of money, and this is the result of the administration in years of profound peace, during which we have been told over and over again by official authority, that all things were well with the Navy. Is this an encouraging time to ask us to put all our eggs into one basket, the Navy?

Again, are these $12\frac{1}{2}$ millions sufficient? Supposing we get through the programme, and at the end of four years have 70 ships added to the Navy, shall we then be able to take and keep command of the sea, in the sense meant by Admiral Colomb? I will quote some naval opinions.

Admiral Sir G. Hornby¹ states our requirements in cruisers alone at 186, of which we had only 22 which he considered efficient; and the same gallant Officer,² in reply to Mr. Forwood, who had said that his demand for 186 cruisers was absurd, states that in 1794 we had 180 cruisers at sea, in 1803 during the Peace of Amiens, 146 in commission and 178 in reserve, in 1804, 257 at sea, in 1812, 444 at sea. He wanted, he said, only 57 new cruisers to make up the required number; he then adds some caustic remarks on the system of administration which, with 106 cruisers in commission, and 23 ready for sea, had actually only 37 effectives out of the whole lot.

In another letter to the public press³ the same gallant Officer gives the number of ironclads required to blockade the 14 French ships at Toulon as 16, which would require 24 ironclads in the Mediterranean (we had, I think, 7 or 8 in that sea at the time), while we had only 28 all told. He considered that 12 additional ironclads should be built.⁴

Sir John Hay, speaking of battle-ships alone, said, if I recollect rightly, in a discussion in this theatre, that we wanted 28 additional battle-ships, and he put their cost at 27 millions. But there are only 8 battle-ships in the new Government programme.

¹ In the City, 5th June, 1888. ² "St. James's Gazette," 11th July, 1888.

³ "Daily Telegraph," 25th July, 1888.

⁴ But in the "Fortnightly" for November, Admiral Hornby, after the experience of the naval manœuvres, puts the requirements much higher. He says there that to blockade the 16 ships at Toulon would require 22 British ships, which would necessitate raising the Mediterranean fleet to 33 battle-ships; and he consequently puts our total requirements at 30 additional battle-ships and something like 250 cruisers.

Finally, in the report on the naval manœuvres published in the "Times," 21st February, 1889, it is officially stated that "Great Britain is *very far* from being as strong as she should be on the seas." And the Committee proceed to give details of the work required to be done, which considerably emphasize the "*very*."

I do not pretend to decide between the conflicting estimates given above, but one thing is absolutely clear, viz., that there is a consensus of naval opinion as to the insufficiency of the Fleet, and a very strong body of opinion that the proposed increase is inadequate to bring the Fleet up to the minimum requirements of safety; and yet it is at this crisis that we are invited to agree to the proposition that the defence of our naval arsenals and depôts by fortification is an exploded error, and that their protection should be left altogether to our all-powerful Fleet.

There is also a claim made, the fallacy of which should be noticed; that as the Fleet is increased, so the amount of money spent on fortification should be diminished; but since it is admitted that until the Fleet is perfect, and indeed after it is perfect, there will always be a possibility of some of the enemy's ships breaking loose, and escaping the blockading squadron of the superior Power, it follows that these ships, which may be of most powerful types, and may be found in any sea, can only be prevented from making disastrous raids on dockyards or commercial ports by the maintenance of *efficient* fortifications kept up to date defensively and armed with effective guns.

2. "No enterprise against an enemy's territory or fortresses is possible within 700 miles even of an inferior hostile fleet, and such an enterprise must always be abandoned if there is the least chance of the loss of command at sea."

Let us look at the facts. The crucial test of the truth of this proposition is stated by Admiral Colomb to be the conduct of the French Baltic Fleet during the Franco-German War, which, though it had undoubtedly the command of the sea, refused to risk the simple bombardment of the coast town of Colberg because there was an inferior Prussian squadron (three ironclad frigates) 700 miles away in the Jade. Admiral Bouët-Willaumez arrived at Kiøge Bay on the 9th August with seven ironclad frigates; he had absolute command of the Baltic, and could have been under no apprehension of interruption by the Prussian ships from Wilhelmshaven, as they were *blockaded there on the 11th August* by a second superior French fleet. Bouët sailed from Kiøge Bay to Dantzic, where he arrived on the 21st August, and then returned to Kiøge Bay; he passed Colberg both going and returning; why did he not bombard? I have shown that the supposed flanking fleet was itself blockaded, and therefore was quite out of the reckoning. We must look for another cause, and it is not far to seek. The Germans were already in possession of a material guarantee in France, and, I believe, threatened reprisals if their coast towns were injured, and this combined with the loss of *morale* on the French side, and the evident hopelessness of making any real diversion in favour of France, are quite sufficient to account for Count Bouët's inaction. His fleet was also, it is believed, badly found, in fact, he

had every inducement to do nothing. But mark the sequel. On the 13th September, in obedience, I believe, to orders from home, Count Bouët did actually order his fleet from Kiøge Bay to bombard Colberg. Now, at this date, the blockade of the Jade had been raised; the French North Sea Fleet had returned to France (on 11th September), and Bouët knew it; the Prussian ironclads were free, and still the French fleet left Kiøge Bay to bombard Colberg. They were overtaken by a storm, and returned without effecting anything; but if the Admiral had feared the Prussian flanking fleet, would he have given the order, after Sedan, when all hope of success was practically gone, would he have run this risk, if it were a risk?

I will take another example which I think is to the point. In 1854 the combined English and French Baltic fleets amounted to 18 ships of the line and 9 steamers. The Russian fleet which retired before them into Cronstadt numbered 22 ships of the line, 5 frigates, and other vessels. After reconnoitring Cronstadt, and finding it too strong to attack with the means at their disposal, the Admirals proceeded to the Åland Isles, and leaving the Russian fleet, which was actually superior in numbers, close on their flank, they, in concert with a French expeditionary force, landed guns and men, and after constructing siege batteries, attacked and took the strong Russian casemated works of Bomarsund. A small force of about nine ships was left to observe the Russians in the Gulf of Finland; but, as I have said, the lighter vessels of the fleet were entangled in the intricate channels between the islands, and guns and men actually disembarked for the attack of a land fortress, in close proximity to a flanking fleet, which not only might, but which it was expected would, sally out from Cronstadt. Can anything be more clear than that the theory put forward of the extraordinary power of the flanking fleet does not hold good universally?

Take now the case of Gibraltar, as stated in Admiral Colomb's paper: the Spaniards "having command of the sea," in 1780, "made a most determined set at Gibraltar," and the place was only saved by its being relieved in 1780, '81, and '82, by the British fleet; or, in other words, the Spaniards attempted an attack upon a strong maritime fortress, though they were in danger of losing, and did actually (on the occasions named) lose the command of the sea, and were driven off by the British fleet; but they returned again and again to the attack, and the place must have fallen into their hands during the absence of the British fleet but for its fortifications.

Professor Laughton, in the discussion on Admiral Colomb's paper, endeavoured to show the inutility of fortification by asserting that the fortifications of Gibraltar, which enabled it to hold out, and thus necessitated its relief, cost us our American Colonies, by withdrawing the fleet from America at a critical time; but this argument amounts to less than nothing as against the utility of fortification. The British Government may have been ill-advised in wishing to retain Gibraltar, but they did wish it, and the fortification of the Rock enabled them to hold it, which they could not otherwise have done; the fortifications, therefore, completely fulfilled the purpose for which

they were intended, which purpose without them would inevitably have failed.

Then there is the French invasion of Egypt in the face of the hourly fear of interruption by a fleet, which events proved was quite able to hold command of the sea. Nelson left Sicily after the French, and passing them on the way, arrived first at Alexandria, and not finding the French there he sailed north looking for them; the next day the French arrived at Alexandria, and the invasion of Egypt was successfully accomplished. This is a very remarkable case: here is the greatest and most energetic of Admirals sailing all round a large hostile fleet without finding it, though the fleets were at one period barely out of sight of each other, and thus failing to prevent the landing of a great expeditionary force, which was risked by Napoleon on this slender chance. It is true the French fleet was afterwards destroyed, but only because they waited for Nelson's return at Alexandria; had they sailed away they might apparently have avoided him as easily in returning to Toulon as they did on the outward journey. And speaking of this very event, Sir G. Hornby asks very pointedly with reference to Nelson's failure to intercept the French fleet, "Are we sure to outdo him?"

But observe what the result of this theory would be, were it established: it would simply reduce the most powerful fleets to complete inaction, even though they might hold absolute command of the sea, and would apparently put an end to naval war. If Count Bouët's action in the Baltic in 1870-71 was paralyzed by the inferior Prussian fleet at Wilhelmshaven, what was the use to him of his command of the Baltic Sea? He could not even bombard Colberg for fear of expending his ammunition, he could therefore have undertaken no other operation which would result in the expenditure of ammunition, and his fleet, though holding command of the sea, was for all purposes of war practically non-existent. The mere statement of this dilemma shows the untenability of the proposition.

3. "A fortified base confers no advantages upon a fleet."

"It does not give freedom of offensive action." In his lecture, and subsequently, Admiral Colomb asserts very strongly that on this point no attempt even has been made to answer him. His argument I understand to be as follows, viz.: a fortified port as base does not give freedom to the defender's fleet, because the port not only requires to be locally protected, but also to have its communications kept open, and as the land defences cannot admittedly do this, they are utterly useless, and the fleet is just as much bound to the port as if there were no land defences.

There is here, I submit, a certain confusion of ideas. Admiral Colomb is assuming the possession of a superior fleet, and therefore it will be impossible for the enemy to keep ships continually lying off any of our ports, for the purpose of closing the port and capturing the commerce frequenting it, and therefore unnecessary for the superior fleet to keep vessels continually on guard for defensive purposes. What we admittedly have to fear is the breaking away of one or more of the enemy's powerful cruisers, who, if there be any

important port left undefended, will certainly make a raid upon it, or else a temporary loss of command of the adjoining sea, by some naval disaster. In either case the port attacked will necessarily be closed while the enemy is in the vicinity, and probably considerable damage will be done to commerce, such as was done continually along our coasts in the Napoleonic war. The ports themselves, however, will, if fortified, remain uninjured, and ready as soon as the enemy is again beaten off to resume their rôles as naval or commercial harbours; whereas, on the other hand, if unfortified, any superiority established by the enemy, no matter how small or how short-lived, would result, in the case of the naval port, in the destruction of the docks and other permanent adjuncts to the efficiency of the fleet, and in the case of a commercial port, to the infliction of a heavy fine, as well as to possible disastrous destruction of property, and of the facilities for future resumption of commerce. The inevitable results would be, I submit, that our fleet would, if the chief naval bases and commercial ports of this country were undefended by fortification, be greatly hampered in their offensive operations, by the fear of the destruction of these important interests during even a temporary absence.

Take again the imaginary instance of the blockade of Brest. Suppose an enemy's fleet shut up in Brest succeed in forcing the blockade with even one or two powerful swift cruisers, an assumption that I may fairly make, as after Berehaven Admiral Colomb admits, that "judgment must be suspended on the point whether *any* force would be competent to seal up a determined and enterprising enemy." What then would happen? Why the blockading fleet must inevitably return with all speed to protect its threatened home ports, thus releasing the bulk of the enemy's concentrated fleet for any mischief they can compass; while if those ports are secured by efficient local defences, they may be left in safety to their own resources, and the escaped cruisers to the tender mercies of the cruisers of the superior naval Power. I presume, therefore, that in this latter case the blockade might go on without interruption, the Admiral being freed from anxiety by means of the fortification of his base.

This view seems to be amply proved by the result of the naval manoeuvres; the escape of a few ships from Berehaven obliged the British Admiral to abandon the blockade and to return in all haste to endeavour to protect the commercial ports.

But, again, leaving the home islands and the narrow seas, let us take the case of the Mediterranean, and imagine a blockade of Toulon, with an unfortified Malta. What would happen? We must, as is admitted, presume the possibility of the escape, at all events, of a part of the blockaded fleet. Anxiety for the fate of his base at Malta, left to the mercy of an unknown force of escaped vessels, will undoubtedly induce our Admiral to raise the blockade, giving liberty to the whole Toulon fleet to proceed on any enterprise it may desire to accomplish, with no certainty whatever that our fleet would catch them again in time; chained as it would undoubtedly be to Malta, until it was absolutely certain the enemy had gone elsewhere. But with Malta secure against all but an attack in great force, how different would be

the feelings of the blockading Admiral off Toulon; he could look with confidence on the security of his base and hold fast to his enemy.

Then there is the important question of refitting: Admiral Colomb has stated that an Admiral in command of a fleet is just as well off with an open roadstead as a base, and has given as an instance Nelson's operations in the Mediterranean, when Malta was in the hands of the French, to prove this contention. On this point we had a very valuable criticism by Sir Lintorn Simmons, who pointed out that during his period of command at Malta he had particularly noticed the frequency of the repairs which were necessary for the modern war vessel, even when engaged only in the ordinary duties of cruising in time of peace. This is, in fact, one of those points where a failure to bring prominently to notice the altered conditions of modern naval war vitiates the entire argument; it is quite possible that Nelson may have got on very well with his wooden fleet in open roadsteads, but how about the modern ironclad? Can it be contended for one moment that her necessities are as easily satisfied as the wooden line-of-battle-ship? In the item of coals alone her wants are incessant and enormous, and she must have a secure *dépôt* of supply. She is practically a moving fort, full of the most delicate and intricate machinery, which needs constant attention, and may at any moment need repair which requires the service of skilled artizans and well-found workshops to carry out; her very fabric, though so strong, is infinitely more subject to dangerous injury from modern modes of attack than was the fabric of the wooden liner from the offensive weapons of her day, not to speak of the everyday dangers of tempestuous seas and unsuspected rocks. All these things are against the iron-built ironclad steamers of to-day, and to assert that any open roadstead, selected from its convenience to the locality of the intended operations, will be as useful to a fleet of such vessels as a fortified and secure dockyard, seems hardly to require refutation by argument.

4. "The possession of maritime fortresses follows the command of the sea, illustrated by the cases of Malta, Gibraltar, and Minorca."

It must be observed in the first place that all the cases cited are very peculiar; two of them are small islands, only attackable from the sea, and Gibraltar, being practically impregnable on the short land front, is similarly open to attack only from the sea; and, in the second place, the facts even as regards these do not seem to be as alleged. The Spaniards had the command of the sea, 1780, '81, '82 (I quote Admiral Colomb), but they did not take Gibraltar. Why? Because it was strongly fortified. The French lost command of the Mediterranean in 1798, but we did not take Malta, it only fell two years after, by famine. Why? Because it was strongly fortified. Minorca did change hands rapidly with the alternating command of the sea. Why? Because it was not strongly fortified. But did any maritime fortress not thus peculiarly situated change hands with the command of the sea? Certainly not. We had absolute and undisputed command of the sea from Trafalgar to the end of the war; did the French maritime fortresses fall into our hands? This assertion may therefore be watered down to this very simple and well-known fact, that a fortress

which cannot be relieved must eventually succumb; but to say that this proves that one should never possess a fortress, is hardly a logical conclusion.

5. Again, "Fortresses have never successfully resisted an attack from the sea;" the obvious answer to this is, that we did not even venture to attack Cronstadt; and we failed miserably in the naval attack on Sebastopol; but I understand that Admiral Colomb has explained this away by saying that he meant by "attack from the sea," an attack by troops landed from ships, as, for instance, at Sebastopol; but here, as the attack was purely a land attack, and had no other relation to the navy than that its supplies came by sea, I hardly see what argument can be grounded upon it. We all know and admit that a fortress *adequately* attacked must eventually fall, simply because the superior force, which is capable of reinforcement in men and means, must weary out and destroy the *morale* of an inferior force, which, by the hypothesis, is not relieved. This has, however, no bearing on the point now at issue.

6. But the most hazardous statement made by Admiral Colomb is that contained in his letter to the "Times" of 11th March, in which he endeavoured to prove the superior durability of ships to forts, with a view to showing the absurdity of spending money upon the latter; and as this letter appeals especially to those who are likely to be equally uninformed as to the technical details of forts and ships, it seems to me to be peculiarly disingenuous.

What is the argument? "The ships built, beside the Martello towers" (before Waterloo), "lent themselves to the discoveries of science; were turned into steamers and served in the Russian War." Were they really the ships of 1815? While "the Martello towers are all but gone." What, not gone yet! thirty years after the ships have disappeared? I will, however, grant that in their present condition these towers are obsolete, but where are the ships of '54, not to mention those of 1815?

Again, "The steam line-of-battle ships built of wood at a later date lent themselves to the discoveries of science and the fluctuation of public opinion, and took their place as ironclads, the most powerful in the world. Lastly, the iron battle-ships built side by side with the forts of 1859-60, &c., and now things of the past (*sic*)," are, "the First Lord tells us, in process of being re-engined and re-gunned, so as, after lending themselves to the discoveries of science and the fluctuation of public opinion, to start on another twenty-five years' career of usefulness," while "we are distinctly told that the fortifications of 1859-60 are a thing of the past," and "If we are again to have a fortification outcry, and it succeeds, most of the present works must come down before the new ones can be put up." And this Admiral Colomb calls "*going unto history!*"

What are the facts? I will take the earliest type of fort of the period named, the masonry casemate with iron shield, and point out¹ that this undeniably obsolete work can, for a cost per gun of about

¹ Drawings were exhibited to illustrate this point.

$\frac{1}{100}$ th of the cost of a modern ironclad, be re-gunned and made practically impregnable,¹ not against its contemporary re-engined battle-ship, but against the most powerful ironclad of to-day; while the contemporary ship, though re-engined and re-gunned, and given a new lease of life, will not be an efficient battle-ship but only a cruiser, a ship of the second class—and this is the *worst* fort and the *best* ship.

Take the continuous iron-fronted forts, as at Spithead; they are as efficient to-day as the day they were built, bar the insufficient thickness of the iron skin; but this was foreseen and provided for, and it only wants the allotment of a sum, moderate indeed as compared with the cost of even one ironclad, to bring the defensive strength of these works up to date, while offensively they are up to date, carrying as they do heavy B.L. guns, a marvellous instance of adaptability in works that were designed for the 9-inch M.L. gun; and they may, in the future, be strengthened up to any required thickness of plating, which is manifestly not the case with a ship. Our re-engined ships will not have their strength increased one bit, only their speed and gun power, and another twenty-five years will finish them, while in another twenty-five years the forts will be in their early youth.

Take next the earthen barbette battery, or that with earth embrasures;¹ these need absolutely nothing but a thickening of the earth parapet, which is neither difficult nor expensive, and the necessary alterations to the emplacements to take the new guns when such are provided; and even in the re-gunned ships I presume that there will be some necessary alteration connected with the improved armament. These earthen batteries are, too, practically indestructible by time.

Here I cannot help noticing Admiral Colomb's poetic quotation, "Britannia needs no bulwarks: no towers along the steep;" it is absolutely true, and yet it is as misleading as the remainder of the letter. The word bulwark, in the fortification sense, applies to works much used about the fifteenth century, but long since vanished into the same limbo as the "Great Harry." The towers along the steep are, however, more modern, though hardly less obsolete, and Britannia does not want them either; she does, however, want, and I rejoice to think will have, certain sunken batteries along the steep; it is the most favourable situation for such batteries, as the Allied fleets found when the Telegraph Battery along the steep at Sebastopol, mounting five guns, disabled six line-of-battle ships and was itself untouched, a fact which, I think, to have been quite candid, the Admiral should have added to his letter.

I have hitherto dealt almost exclusively with the war navy, but it must not be forgotten that the fleet exists for the Empire, not the Empire for the fleet, and that a large part of the duties of the fleet in war will be connected with the protection of the commercial marine. It seems, therefore, not unreasonable to inquire how the defence of certain ports, or harbours of refuge, may affect the safety of the trading vessels, whose safe arrival in our ports is admittedly a condition of our national existence.

¹ Drawings were exhibited to illustrate this point.

It seems to be admitted that it will be impracticable to convoy our trade across the great ocean routes; there, in the open sea, our ships must trust to their speed and the sagacity of their commanders to avoid the enemy's cruizers; but as these routes converge into narrow seas the conditions will be different, and here it will no doubt be most advantageous, as has recently been pointed out by a distinguished naval Officer, to have ports secured by coast defences, into which such ships can run if pursued, where they can assemble in security, waiting convoy, if that be possible, through the narrow seas, or waiting for information that the coast is clear for them to make a dash for their destination, or at all events for the nearest fortified port, there to await in safety the next opportunity to move on; such harbours would not have their usefulness limited to the home islands. The foreign coaling stations, to which steamers must converge by the necessities of the case, would likewise, if fortified, afford them a safe refuge while coaling, or refitting, if necessary, and would enable them to await in safety a favourable opportunity for pursuing their voyages; and can it for one moment be denied that the existence of such safe refuges for trading vessels, where they might be safely left to the protection of the port defences, would be of inestimable value to the naval commanders engaged in the attempt to clear the neighbouring seas of the enemy's cruizers, leaving them free from all anxiety for those vessels which had run into the defended ports of refuge, and giving them in consequence vastly increased freedom of action in dealing with the enemy?

If, then, Admiral Colomb's conclusions are wrong, wherein lies the fallacy in his argument? It is, I think, twofold. In the first place, the command of the sea claimed for the superior Power is an absolute command at all times and in every place, no possibility of weakness or failure is admitted, and that this should be a necessary condition to the successful enforcement of his theory, displays at once its fatal weakness. Perfection is unattainable: the best human arrangements must always be liable to failure from a thousand unforeseen accidents, and that this is peculiarly the case in war has long been an axiom. He has also omitted to notice the practical difficulty; the fleet required to carry out his scheme of defence is manifestly entirely impossible of attainment. I have already shown that the additions now proposed for the Navy are by no means sufficient to satisfy naval opinion, and yet as regards even this small instalment an ex-Prime Minister has said in Parliament that he knows no reason for it. What chance is there then of getting the whole naval demand satisfied? But I do not rely on this argument, though it is practically available. I cannot agree that fortification only exists on sufferance because the fleet is weak; if all the money required for the defence of the Empire were voted to-morrow, it would still be folly to spend it all in ships, for two reasons: 1st, because a great deal of the work of coast defence can be much more cheaply done by local land defences than by ships; 2nd, because there is no panacea for all the ills that Empires or men are heirs to. A satisfactory defence of the Empire can only be attained by a just combination of all the elements of defensive

strength, ships, forts, material obstacles, organization of men. To exalt the value of the Fleet, which is admittedly the most important factor, above all the other component parts of the defence, to trust altogether to the first line without supports or reserves, and, above all, to commit the unpardonable sin in war, of undervaluing your enemy to such an extent as to think any possible precaution against his attacks may be safely omitted from your programme of defence, is to fly deliberately in the face of every lesson of history, and to carry the arts of the quack medicine man into the sphere of national defence.

In the second place it is assumed, equally fallaciously I think, that defeat must also be complete and absolute. This is the basis of the demand for the disbanding of the volunteers as useless on the ground that invasion of this country is unnecessary, because defeat at sea means rapid starvation, and compulsory surrender to any terms demanded by the victorious enemy. I confess that though I do not consider the British fleet to be endowed with a divine invincibility, I have a much higher opinion of its resources than to believe that the dispersion, or even destruction of one squadron, say in the Channel, must necessarily entail the collapse of the whole fleet and the surrender of the Empire, but I do say most unhesitatingly, that such destruction or dispersion may give just the opportunity for invasion, which I strongly believe to be possible, owing to the increased power of transporting troops at the right moment, without waiting for winds or tides, which steam has created. Consider what the prize is, and if a possible invader knew that once across the narrow sea he had nothing more to fear, how enormous the temptation; therefore, I say, with all due respect to Captain Penrose Fitzgerald, organize every defensive measure in its due proportion and in its proper place, and even serve out ball cartridge to the volunteers. "The first shot they fire in anger will," said that gallant Officer, "be the death knell of the British Empire;" suppose we grant even that, for the sake of argument, what will be more likely to defer the firing of that fatal shot than the knowledge that the volunteers are prepared to fire it, what more certain to accelerate the crisis than a suspicion that they have only blank cartridge in their pouches?

What, then, is the rôle of fortification? It is only delay says the gallant Admiral, and this, in a general sense, we may accept; the smallest field obstacle causes delay to the enemy under fire, and so increases his losses, and diminishes his moral force and his chance of ultimate success, the strongest permanent defensive works delay the enemy's attack, say upon a Portsmouth or a Malta, to the extent most probably of deferring it altogether; in either case the effect sought for is produced, and the fortifications have fulfilled the object for which they were created. Between these two extremes there is every variety of development, but the same principle is everywhere involved. The fortifications of the distant coaling station delay its occupation by the enemy's fast cruiser, till she is either compelled herself to retreat for want of coal, or is driven off by a relieving force. But it is said, why spend enormous sums on gigantic works

for this purpose? On this point I can only reiterate what I have already said in this theatre, that there is no enormous expenditure taking place, there are no gigantic works being erected, the defences which are at the present time being constituted throughout the Empire represent an absolute minimum, and strange to say, though all the schemes of defence are the result of joint consideration by military and naval Officers, it will, I believe, be found that the naval opinion in cases of difference was generally in favour of more extensive defences than those undertaken, which were watered down to suit the extravagant soldiers.

Having now, I think, given some reason for distrusting Admiral Colomb's conclusions as to the inutility of fortification generally, and the impossibility of attack by an expeditionary force upon the British Isles, I will venture to assume the advisability of defence other than naval, and to point out some considerations which bear upon the subject, and first, as to our maritime frontier in relation especially to the defence of the home islands; it has been pointed out that a maritime frontier is in its nature very much akin to a mountain frontier pierced by well-defined passes, and impassable at other points: the mountain passes being represented by the harbours, estuaries, or beaches along the coast suitable for the disembarkation of troops; but though apparently similar, there are important differences between the two cases, two of which should be noted, viz. :—

1st. The greatly increased facilities for surprise at the point selected for crossing the frontier, which results from the conveyance of the troops by sea in a compact body, instead of by difficult and narrow mountain roads, and this advantage is often combined with that of being able to put troops on shore simultaneously on a broad front.

2nd. There is the operation of landing from the transports, which introduces a period of great difficulty and danger into the assailant's enterprise, no matter how successfully it has been conducted up to that point, if this landing has to be made on an open beach; a difficulty depending on natural causes (wind and weather), altogether apart from any hostile opposition from the shore, though it is intensely aggravated by such opposition, while interruption from the sea may convert the difficulty into an impossibility fraught with disaster. Hence the value of secure harbours sheltered from the weather, and offering facilities for disembarkation, to an attacking force.

These considerations seem to me to point to the following conclusions regarding the defence generally, viz. :—

1st. The necessity for denying to the enemy, by means of local coast defences, the use of all harbours or estuaries specially suitable for disembarkation, and conveniently situated with reference to his objective point.

2nd. The great importance of a very careful organization of the defending force, and for a thorough system of watching the exposed

points, which, as in the case of much of the southern and eastern coasts of England, may be of considerable extent. I must not be mistaken as advocating an impossible defence by a cordon of troops or works, but only such an organization for the conveyance of intelligence, as combined with a careful selection of points for occupation by concentrated bodies of troops, and the intelligent use of railway communication, may insure that any attempt to land a considerable force shall be met with a more or less powerful resistance on the beach. A force attempting to land is never so helpless as during the period of transit from the ships to the shore, and to abandon all resistance at that point, in order to withdraw to positions, no matter how strong or how well chosen in the interior, is, I think, bad tactics. This was Nelson's opinion, and I think he was right, though the difficulty of carrying out such a defence efficiently, has, I think, tended to increase since his day. Steam alone has largely contributed to this difficulty, and added enormously to the chance of a successful surprise on an open coast, by rendering the assailant independent of wind and tide for his movements, and also by facilitating the actual landing, by the use of steam launches, &c., advantages which, I think, more than counterbalance the advantages of rapid concentration conferred by steam upon the defence.

The greatly increased value of the trained and disciplined soldier, as compared with raw levies, however brave, a value which every improvement in weapons tends to emphasize more strongly, tends also I think in the same direction.

Against coast batteries, however, the case is different, and I incline to the opinion that the chances of successful attack from the sea against such works, if properly designed and constructed, have been lessened rather than increased by modern improvements in arms and appliances of war.

Coast batteries must, however, be restricted to those vital points upon which the organization of our fleets and the security of our commerce depend, and must, as to their nature and extent, be directly proportioned in every case to the magnitude of the interests involved, or rather to the kind of attack which the nature of those interests renders probable.

It may be assumed that for us the great military ports (including Malta) are the only ones which require to be defended on the largest scale; the destruction of the naval establishments at Portsmouth would be so severe a blow to the prestige of the Empire and to the efficiency of the fleet, as to make it worth while to attack it in force if weakly defended, though the danger of attack is greatly reduced if not altogether eliminated by the existence of strong defences kept in an efficient condition.

With the commercial ports the case is different: the object to be gained by their capture would not compensate for the risk of valuable ironclads, and in this case, as well as in that of the great majority of the foreign coaling stations, the attacks to which they are exposed will probably be confined to raids by one or more swift cruisers, and the defences should therefore be designed on a much smaller scale, and

will, if efficient, have very probably the desired effect without firing a shot.

Now, as to the nature of the defences required, they must in the first place be permanent works designed and built in time of peace, for the very simple reason that the mountings of heavy B.L. guns, dealing as they do with excessively violent strains, require for their stability to be so massively and securely fixed, that there is no possibility of extemporizing emplacements for them; and here I must notice the consistent detraction of permanent fortification in articles in the public press, and even in speeches and papers in this theatre. Take, for instance, Captain Stone's opinion "that any elaboration of our complicated systems of permanent fortification is to lose sight of the end in the means," &c., &c., and "a couple of well-placed earthen barbette batteries might do more for the defence than the most approved casemate battery," &c., &c.; but does Captain Stone really think that the earthen barbette battery which he commends is not permanent fortification? And how constantly we hear the cry: "Oh, give us earthworks like Plevna, or like Sebastopol, but for Heaven's sake no permanent fortification." It really seems as if to many persons permanent fortification was synonymous with Vauban's bastioned traces or the so-called modern French system; whereas permanent fortification means simply works of defence, whether simple or complicated, built of permanent materials, as all works built before they are intended to be used must be, and as all works mounting modern heavy guns must necessarily be. How absurd this cry is may be gathered from the fact that the works now being constructed for the emplacements of the new guns which are being added to our sea fronts, though necessarily permanent, would in every case come under Captain Stone's definition of earthen barbettes, except where there is absolutely no earth available.

The types of works in existence in our maritime defences may be placed roughly in three classes:—

- I. The casemated masonry fort with iron shields.
- II. The casemated battery with continuous iron front.
- III. Earthen barbette or disappearing batteries, for guns mounted either on disappearing or overbank carriages.

Of these brief mention has been already made; and I have shown that while the first is practically obsolete in design, in the sense that it will not be reproduced, it may still be rendered capable of a good resistance to modern guns. While the second, given the additional thickness of plating rendered necessary by the increased power of guns, is as efficient now as when it was originally designed for the 9-inch M.L. gun, and might now be reproduced either in Gruson iron, or wrought iron as in our forts, as one of the possible methods of defending certain limited and exposed sites.

But there is undoubtedly a strong feeling in favour of the third class, and it is a fact that every emplacement now being built throughout the Empire is of this class; wherever the sites are low and B.L. guns are provided, it is combined with a disappearing

mounting, and by this means I believe the maximum of defensive and offensive power for shore guns, against ships, is attained. Experiment¹ has actually proved that the chance of hitting a gun so mounted from a moving ship is extremely small.

The system of coast defence now in favour in this country is to take full advantage of the power of modern artillery, in order to disperse the guns both in plan and elevation without losing the power of mutual support, and also to give them the greatest possible amount of concealment by the use of disappearing mountings, and by the assimilation in appearance of the batteries to the surrounding ground.

The adoption of high-angle fire from heavy howitzers is another feature of the present system which promises good results and fortunately at small cost. There are numerous M.L. guns which, with slight alterations, make efficient howitzers; and since these weapons need not be placed even within sight of the water they command, their emplacements can be very cheaply constructed. It has been proved by experiment that the fire of such batteries, directed by position-finders, will be very formidable to ships whose decks cannot be made strong enough to resist the impact of heavy shells descending upon them at high angles.

The following results have been obtained experimentally, viz., 44 per cent. of hits on the deck of a stationary ironclad at ranges of from 3,000 to 4,000 yards with angles of elevation of 30° to 70°, and 20 per cent. of hits on the deck of the "Inflexible," with position-finder, at unknown ranges of 4,200 to 9,900 yards.

The general tendency then of modern progress in coast defence has been towards the dispersion and concealment of guns, and a reliance on the effect of flat earth slopes to deflect the enemy's heavy projectiles, rather than on costly structures of iron or masonry intended to resist them by massive strength. Masonry is used in parapets only where it is impossible to obtain earth, and then in the form of flat slopes of concrete. Advantage is taken of the great range of the B.L. guns to put their emplacements on high sites, in many cases where with the old M.L. guns it would have been impossible, and of the similarly extended range of howitzers, to conceal batteries for high-angle fire altogether from the sea.

Time warns me to touch very briefly on the question of land defences. It is obvious that the gorges of our great maritime fortresses must be secured from being surprised and taken by a *coup de main*, and this is the more necessary because the modern type of coast battery is itself, as a rule, only slightly defensible against assault from the land side, but the land defences need not, I believe, anticipate any attack by regular siege, and they may consequently be reduced to the minimum required to resist assault by open force, without any sufficient previous preparation by the fire of siege guns.

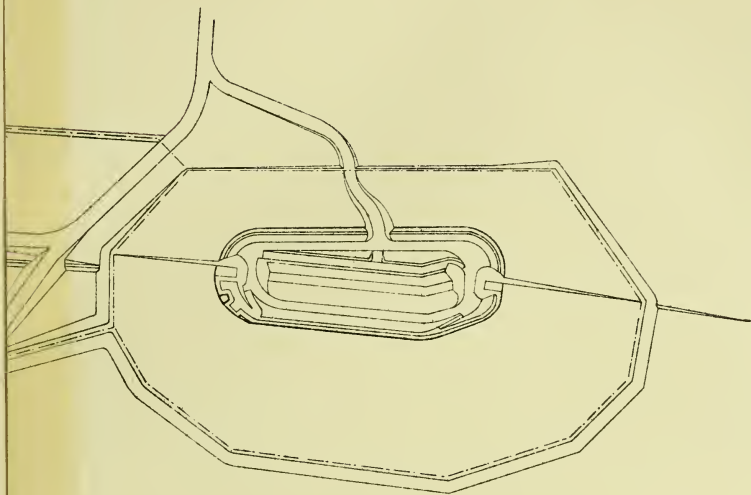
Here, again, we are at once met by the cry of "Remember Sebastopol, remember Plevna, no permanent works!" But what is

¹ "Hercules" experiments at Portland, November, 1885.

the real lesson to be learned from Sébastopol? Here we see a magnificent defence of a position (the word siege is a complete misnomer) carried out with the assistance of a practically continuous line of earthworks which were constructed by the defenders during the continuance of the attack, which construction was rendered possible by the possession of enormous resources in men and guns and by the genius of Todleben. These works were of very slight profile it is true, and were not technically storm free in the sense that there was no really insurmountable physical obstacle to assault, but they held out for nearly a year against a vigorous attack. Why? Because they were defended by a garrison so powerful that it was able even to take the offensive, and practically to reduce the assailants to the position of being themselves besieged in their sea-girt position—and from this we are asked to draw the conclusion that this is the best method of defence for a besieged place. Can any reasonable man doubt what a satisfaction it would have been to Todleben to have found the works at Sébastopol, such as they were, ready to his hand, rather than to have been obliged to build them under fire with enormous loss? Can anyone doubt that if it had been a real siege, and the place invested, the garrison (any possible garrison) would have been utterly incapable of bearing the enormous strain of this work in addition to their everyday duties of resisting the attack? Can anyone, in fact, maintain that it is wise policy to place upon the shoulders of the garrison of a besieged place the enormous burden of constructing the works of defence after the investment is formed, and under fire, instead of having permanent defences ready to hand, the necessary improvements and additions to which (inevitable in an active defence) will afford more than enough of work for the garrison? Sébastopol, Plevna, and many other instances, teach us that an active and bold defence may, and will, do wonders even behind the most apparently feeble works; they teach us the inutility of constructing elaborate works *à la* Vauban; they teach us the value of simplicity of design in consequence of the extreme value under present circumstances of the development of frontal fire; they teach us, in fact, the kind of works we require, but I deny altogether that they teach us that the construction of these works should be deferred till the enemy is at the gate, or that there is any inherent disadvantage in having our bomb-proofs built of concrete instead of timber. And, mark, this is the only difference between permanent and field fortification. It is an absurd fallacy to say that because Vauban, Cormontaigne, Brialmont build or have built works of the utmost complication, and of the most elaborate and expensive detail, that we should therefore build no works at all, but should throw upon our raw garrisons the extra duty of doing so in the face of the enemy; and recollect that this is what this senseless outcry against permanent fortification practically amounts to.

Every Continental nation¹ is at the present moment rushing into

¹ The Belgian Government have ordered 147 turrets for Liège and Namur. The Germans 60 for Metz and Strasburg. French frontier forts also have cupolas.

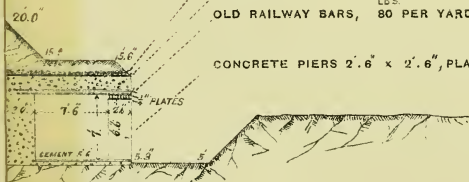


LOOSE FILLING.

ASPHALTE.

OLD RAILWAY BARS, 80 PER YARD.

CONCRETE PIERS 2'6" x 2'6", PLACED 10' FROM CENTRE TO CENTRE.



DESIGN FOR PERMANENT INFANTRY KEEPS.

SCALE OF PLAN.

FT. 50 0 50 100 150 200 250 300 350 400 450 500 FT.

SECTION THROUGH FRONT PARAPET AND DITCH.

9.0'

SLOPE ABOUT 1 IN 6

20.0'

LOOSE FILLING.
ASPHALTE.
OLD RAILWAY BARS, 60 PER YARD.

CONCRETE PIERS 2' 6" x 2' 6", PLACED 10' FROM CENTRE TO CENTRE.

DATUM LINE 0.

SCALE OF SECTION.

0 10 20 30 40 50 FEET

ASPHALTE.

OLD RAILWAY BARS, ^{LSB} 60 PER YARD.

CONCRETE PIERS 2' 6" x 2' 6", PLACED 10' FROM CENTRE TO CENTRE

DATUM LINE 0.

SCALE OF SECTION.

SCALE OF SECTION.

10 5 0 10 20 30 40 50 FEET

iron as the only possible protection of their great fortress guns against the power and accuracy of modern siege trains. Can we suppose that poor and heavily burdened States are doing this in mere recklessness, and without an absolute belief in its necessity; can we believe they are ignorant of the art of war? We in this country, trusting to our practical immunity from the danger of attack by regular siege on the land fronts of our fortresses, consider that we can do what is required of us with less expensive designs; but I say it is not wise to defer the execution of the simple proposals which are brought forward till it is too late—that the moment of accomplished invasion will be too late, there can be no doubt whatever.

In the case of the existing works we are in most cases fortunate in having them placed sufficiently far from our dockyards, they having been designed after the greatly increased range of modern artillery was at all events clearly anticipated, and the works themselves have no more than the almost necessary defects of their period. They are much too elaborate and expensive, as well as too commanding and conspicuous, and they lack that abundant provision of bombproof cover close to the parapets which is the first necessity of defence under existing conditions. They are in fact designed as artillery positions, whereas I believe it would be quite sufficient if they were simply constructed as permanent musketry keeps, leaving the artillery defence to be carried out by movable batteries in the intervals, and were of much lower command, and withdrawn if possible from the forward crest of the position to more retired sites. The defence of the forts would then be chiefly a musketry and machine-gun defence, and they would act as strong supporting pivots to stiffen the defence, and to prevent the enemy from reaping a permanent advantage from any temporary success in the intervals between them.

The great power of holding works given to steady troops by the modern rifle strongly favours this method of defence, but it must be admitted that large and efficient garrisons are required; and though this mode of fighting in a prepared position is favourable to the half-trained troops that alone could be spared for garrison duty, it should be very carefully borne in mind that this lack of training must not be allowed to fall below a certain point, and that the more the troops intended for the various garrisons are made acquainted with the ground where they will have to fight, the better will be the chance of an efficient defence.

I have shown on the board a diagram (see Plate) of a permanent work suitable for the kind of defence I have indicated. This work has been designed for a special position, and partly executed, and its simplicity and cheapness will commend it, I hope, even to the most rabid opponent of permanent traces *à la* Vauban.

A regular siege we have not, I believe, to fear, and I will therefore content myself with a simple protest against the acceptance of Vauban's siege, with Q.F. guns thrown in, presented to us by Captain Stone, as in any way representing the most recent ideas on the subject, and I venture to add that the teaching of our military schools seems to me to be largely responsible for this, as well as for the

false ideas of permanent fortifications which are, I fear, widely prevalent.

Finally, I must very briefly dismiss the important subject of organization of the personnel, which I had hoped to have treated more fully.

In spite of all the improvements in matériel, there is one factor unchanged. The most powerful ships, the heaviest guns, the most scientific devices for directing their movements and their fire, still depend for their manipulation upon human agency; the man remains the same whether armed with a bow and arrows or a repeating rifle. How will this factor be affected by the marvellous extension of the destructive power of modern appliances of war? What will be the moral effect on a fleet of the sudden destruction by torpedo or submarine mine of a battle-ship or two? What on a ship's company of the bursting of large charges of high explosives between the decks? How will the garrisons, not to speak of the civil inhabitants, of fortresses, maintain their moral tone in the presence of similar explosions? And for troops in the field the strain will not be lessened by the greatly increased efficiency of shrapnel and the use of high explosives. These considerations seem to me to point to the necessity for the highest training, the most perfect discipline, as the necessary preparation for success. For the Navy this training more or less exists. The ordinary life at sea, with its continued struggle and watchfulness against the forces of Nature, itself provides a training for war; but is it so in the land forces? Raw troops will be more and more at a disadvantage in combating with trained and disciplined men, and we depend, and must under present circumstances continue largely to depend, upon troops whom it would be affectation to describe as fully trained.

It is said that we shall fight behind works in some prepared positions; but it will be the business of the enemy to manœuvre these raw troops out of such positions, and to be content with partial efficiency on any such ground seems to be less than common sense. Then there is the necessity, already alluded to, of meeting the enemy on landing. This must be done, if successfully, with trained and fully mobile troops, and under a most carefully considered plan of campaign. We require a carefully elaborated organization, under which every man, fully equipped and fully trained, will move at once into his place on a given signal. Have we got it? If not we are practically trusting to a single line of defence, even while we loudly assert the insufficiency of that line, and this in the face of Europe in arms.

May I venture to indicate a policy in this matter? It is very simple, and not very expensive. Its cost would consist chiefly in the casting away of some old prejudices. Barrack square inspection must then give place to real field training, and the Officers of the Army must be made thoroughly professional and be more thoroughly instructed. Our present instruction is too bookish, too little practical, and I venture to think not searching enough. We hold the greatest Empire on earth because we are, or are believed to be, strong enough to maintain it as it was won, by the sword. The truest word spoken

in this controversy is, "A great Empire must be strong or perish." Let us rise to the height of this great cause, and choose, at the sacrifice of some luxury—some effeminate longings after universal peace—some distaste for the militarism of the professional soldier—to be strong, not only in ships and forts, but in the thorough organization and training of our forces for war.

John Bull is fond of boasting loudly that he is a peaceful trader, loving justice, mercy, and free trade; that he regrets the necessity for fighting, and pays other people to take that part of the duty of citizenship off his conscience. The rude way in which these mercenaries swagger round the world is painful to his finer feelings, but still he is very generous, and grudges no expenditure in supplying them with the very best of everything required for their calling; it is simply ask and have. One smiles rather sadly at every repetition of this well-worn boast; for at the best it is hardly a very noble sentiment, and besides it is not quite true, as those who have to ask this very generous person for money know too well. He is inclined to pay neither in person nor in purse; if this great Empire is not to perish, he must do both.

The CHAIRMAN: I have now to invite you to discuss this subject, which has been placed before us in a very able manner by Major Walker, and in doing so I must remind members of the rule which confines speeches to ten minutes. It is especially necessary on this occasion that some mercy should be shown to the audience, as, no doubt, many Officers will wish to address us. I have now great pleasure in calling upon Admiral Colomb to speak, as I know he has come here prepared to do so.

Admiral COLOMB: My Lord, ladies, and gentlemen, I have no wish to compare Major Walker to Goliath of Gath, still less have I, I am sure, any wish to compare the present audience to the hosts of the Philistines, yet I cannot help feeling a little like David on the present occasion, more especially as Saul over the way, at the Board of Admiralty, has not provided me with the official armour which my gallant friend has enveloped himself or his case in. But, gentlemen, I have been down to the brook, and I have got, I think, five smooth stones, which, if time permitted, I might endeavour to sling. But I am in this difficulty, my lord. You have rightly drawn our attention to the ten minutes rule. I am quite sure that those who listened first to Captain Stone's paper, then to mine, and now to the very able paper we have had to-day, must be well aware that what they are discussing are the fundamental principles of the defence of this Empire. We are spending 34 millions ostensibly on defence, and whether we are rightly or wrongly spending it appears to me to depend upon whether we get the right or the wrong answers to the paper which has been read to-day. The expenditure of the Army and Navy are interdependent, but the discussion which has hitherto taken place over this question shows no principle existing between the Army and the Navy, in the matter of defence. Both Services work independently. The Navy, as we well know, officially declines to have anything to do with defence: it says that is the War Office business, and the Army accepts that position, and goes to work to defend on the principle that the Navy is either always away, or always helpless under its shelter. The case seems to me worse since the reading of this paper, because what it has disclosed, coming from the source it does, is that the operations of naval war are not well understood by those who are preparing to defend the country against them. The language that I have been using of late, and especially the language that I used in my last paper, is not understood: it is paraphrased and altered without those who paraphrase and alter being aware of what they are doing. That is present in a very remarkable degree in this paper. I have to thank the lecturer for the paper—I am delighted that it should have been

read. I should welcome more papers of this character, because I think that we are not to the bottom of the question by a very long way, and I have to compliment him on his vigour and earnestness in the composition of the paper. I have to thank him most sincerely also for admitting the great principle that our appeal must be to history, or, as Professor Laughton has better put it, "to experience." There is no way that we can get to the bottom of any of these questions, except by the experience of the past. And I have to thank the lecturer also for what I consider a very marked and clear attempt to get on to my ground; yet so difficult has he found it to understand what that ground is, that he has most freely both misstated and misquoted. His six postulates, as he puts them, are far from any of my expressions, and my trouble is this, that until I have in some degree corrected the misstatements and the misquotations, I find it would be very difficult for us to proceed to a general discussion. And then there is another point. I feel that it is exceedingly necessary for us to guard ourselves in the language we use, and to keep in the icy atmosphere of scientific discussion. There are one or two expressions, if I may be allowed to say so, in the paper which has been read, which might if pursued tend to get us away out of that icy atmosphere. And I want to say this, that from my side, and as far as I understand what the discussion ought to be, it certainly is not Navy against Army, nor has it anything to do with any question of collision between the two Services. I am able to say that myself, because I have received encouragement from many military Officers, and from a few whose names even I did not know, and some whom I had not spoken to previously to the reading of my last paper, have said to me, "Do not you let it be said that you are in any way attacking the Army. We see quite well that it is not so. We see quite well what you are driving at. We see that the great question is as to the right division of labour between the two Services, and there is no question of any sort of rivalry." My position is, that I have such a feeling for the Army, so strong a sentiment with regard to it, that, as far as I can measure my own thoughts, the prevailing impetus which has driven me to this position is a brother's feeling for the army of Marlborough, of Wellington, of Lord Raglan, Lord Clyde, and that magnificent fellow Outram, of whom I never can think except as side by side with Nelson, and your own army, my Lord, in Egypt. Now I cannot bear the thought of a thing which seems to me likely to take place if men feeling and thinking as I do, do not come more to the front and state as far as they can what the position is. I greatly fear the shutting up of this magnificent Army all over the world in useless garrisons—garrisons which, if we are not guarded, may be unnecessarily large. I do not say whether they are or are not necessary, but I do say that they may be, if we do not take care, unnecessarily large, and that the Army may be greatly hampered by the shutting up of an enormous force inside fortresses. And now, my Lord, upon that I must express much regret that you did not see your way to take the chair at both sides of the discussion. I was very anxious that a military Officer should preside, and I am very much obliged to Sir Frederick Stephenson for presiding at my lecture, because that tended to keep us in the icy atmosphere, to prevent any question arising between the Army and Navy, and to keep us to the purely scientific question of the division of labour between the two Services. Now you see the position I am in. I am in the hands of yourself and the meeting; but to answer the paper will take time, and I do not see that the general discussion can go on until I answer categorically, at any rate so far as the misstatements and misquotations are concerned. But I have written the reply, and I thought it might be a possible way out of it if the discussion could be adjourned and these replies could be printed and circulated previous to the full discussion. However, of course I am quite willing to go on. I am in the hands of the meeting altogether. I can now just make the one or two general observations, and prepare myself to ask the Council's permission to read a paper fully dealing with that before us.

The CHAIRMAN: My own view would be to exactly follow out what Admiral Colomb has proposed, that is, that he should now continue the interesting speech which he has begun, and leave the question of printing any larger paper that he may have to the discretion of the Council.

The question was then put, and it was agreed that Admiral Colomb should continue the summary of his written replies. These will be found in full below.

General Sir LOTHIAN NICHOLSON: It appears to me, my Lord, that we have heard what I may call a second paper, and it is hardly fair to those gentlemen who want to join in the discussion that they should be called upon not only to answer Major Walker, but to take up the cudgels also with Admiral Colomb. Therefore I should propose, with all due deference to the Council, that the replies (or paper) which Admiral Colomb has been kind enough to read in answer to Major Walker should be printed and circulated in due course, so that the members who have done us the honour of being present to-day can have an opportunity of discussing the two together. I think that would be a simpler method of doing it, because to answer it now the poor man will be confused between Major Walker and Admiral Colomb, and he will not know which is which, and all the re-explanations which Admiral Colomb has been kind enough to give us, and which I confess have puzzled me rather more than I was before, will be still more puzzling to answer. I think that, my Lord, is the only way out of the difficulty.

Colonel BRACKENBURY having seconded the proposal, which was agreed to, the meeting was then adjourned to May 9th.

CATEGORICAL REPLIES TO MAJOR WALKER'S PAPER: "ON FORTIFICATION AND FLEETS." BY REAR-ADMIRAL P. H. COLOMB.

Extracts.

"England is the only civilized country where at the present time it is possible to stand up and to deny, with any chance of acceptance, the utility of permanent fortification."

"The average Englishman looks with suspicion on fortifications."

Replies.

I. I do not myself deny, and I never met any one who did deny, the utility of permanent fortification.

II. An article in the *Avenir Militaire* of the 12th April, signed by a General Officer, says that in the defence of the French coasts by fortification they are alternately swayed by two totally opposite currents of idea. Sometimes they endeavour to fully protect every place liable to attack or simply accessible; sometimes—frightened at this dispersion of resources, forts and batteries are sacrificed in order to take them to pieces and reconstruct them, to the great detriment of their finances.

This Officer thinks the French will be right to abandon all the batteries intended for the defence of open roadsteads, and says that the attempt to be everywhere strong will end by leaving them everywhere weak.

III. From an American source I learn that criticism has arisen from the fact that the Board of Fortification has proposed an expenditure of 11,000,000*l.* on fixed defences without any provision for the garrisons.

I. The average Englishman voted 11,000,000*l.* for fortifications in 1860, and 3,000,000*l.*, 1887.

II. The whole of the great commercial ports have recently joined to urge the Government to erect fortifications—rejecting with contumely the Govern-

Extracts.

"Admiral Colomb, as I understand him, withdrew so far from the position . . . as to admit the usefulness of fortification within certain limits—only to object to its employment on a large scale."

"Admiral Colomb, appealing to pre-judice by the platitude, 'Britannia needs no bulwarks,'" &c.

Replies.

ment counter-proposal to introduce local naval defences to keep the ports open.

III. All the early part of last year and the whole of 1887, the provincial press teemed with articles demanding fortifications, and condemning my views whenever they got them—which was constantly.

IV. The whole demand for the coal-ing stations is fortification—not a word is said for keeping those ports open.

V. The U.S. Journal in the first thirty volumes contains forty-three papers referring our defence almost exclusively to fortifications. Not a single paper referring it exclusively to naval means, and only two or three admitting the Navy to a share.

VI. It is perfectly well known that for some years back the Admiralty has systematically refused to concern itself with any defence of territory, and it is allowing, at this moment, all our great commercial ports to be prepared for the closure by submarine mines.

I. In my paper I said: "The importance of the question I raised, and the difficulty in dealing with it, spring from the fact that, *primâ facie*, no one denies the value, if not the necessity, of a certain amount of local defence for the ports of a maritime Empire. But then no one knows where to stop."

II. I had, therefore, nothing to withdraw from. I pointed out in my reply that I had no idea of leaving any port absolutely defenceless. Meaning clearly that it was naval defence which was first required.

As Sir John Colomb said twenty-two years ago: "Our object should be, to ensure the safety of those ports *in* our possession, and to afford protection, *not only to them, but to as great an area as possible around them.*" "Protection of our Commerce," p. 17.

I. This is a misquotation and, therefore, a misunderstanding of the language.

I was making a statement, and appealing to nothing, I said there were three periods only when there was a demand for fortifications—the Martello Tower time, 1860, and now. "At all other times," I said, "Britannia *needed* (not 'needs') no bulwarks," &c. I meant, of course, that this was Britannia's opinion. I said nothing about mine.

Extracts.

"He asserts that there is . . . no fear of any territorial attack, not only on the shores of these Islands, but even on any part of the Empire."

Quoting "Times" of August 30th, 1887.—"Ten or twelve guns can be mounted, even in War Office cupolas, for less than the cost of a single iron-clad."

Quoting me in "Manchester Courier," on destruction of our trade by enemies' cruizers, says: "Where were our superior fleets? Why was there not a superior force present on every occasion to save these British ships?"

"Every important base and every naval arsenal, if left undefended by fortification, will have to be watched and defended by ships told off for the purpose and chained to the port."

"Admiral Colomb's assumption that such cruizers would not attack undefended ports for fear of interruption, is altogether untenable."

"Naval history may answer, 'No,' but what would be said by his superiors to a naval Officer in command of a powerful modern cruizer . . . who should refuse," &c.

Replies.

I have never said any such thing. I have always held that we are running the greatest risks. My fear is that belief in fortifications might blind us to the risks.

I. As used, this is a misstatement of the fact. Ten or twelve guns mounted in cupolas would have no effect in *keeping the Thames open*, which is the work which has to be done, and might be done by a single ironclad.

Commerce is not directly protected by "fleets" unless they are used in convoy. Fleets have nothing to do with the case in point. Fleets are compact bodies to operate against similar compact bodies. Commerce must be attacked by scattered cruizers, and, if no convoy, defended in the same way.

My fear is, that the money which should go on cruizers might go on earth, stone, and iron walls.

Certainly, whether or no. Such ships are absolutely necessary to keep the port open, whether there are fortifications or not.

The Germans sent out the only cruizer they had in 1870. She captured French ships off the Gironde, and nothing but naval force on the spot could have prevented her.

Where have I assumed any such thing?

I have said I thought that five battleships would not. I have always held that cruizers might, if there were nothing afloat on the spot to stop them.

Naval history hardly answers "No" as to single ships and light attacks.

It only says distinctly "No" as to the organized attacks by fleets. But it must be said that, while its answer is positively "No" in respect of the organized attacks by fleets, it is not so positively "Yes" in the case of cruizers belonging to the inferior naval Power which does not pretend to the command of the sea. And even in the former case the light raids are made, not on the port, but on the shipping supposed to be protected by the fortifications of the port.

Thus Cushing makes his way by night in a steam-launch up a river to Plymouth, and torpedoes the "Albemarle," lying alongside a wharf.

Yelverton, with "Arrogant" and "Hecla," penetrates seven miles up a creek to carry off ships supposed to be

Extracts.

“ . . . The common-sense of our rulers who have fortified Plymouth.”

“ If reasons have been given for refusing to believe that even the most powerful fleet in the world can ever keep the coasts of the home islands entirely free from the enemy, how much more will it be possible to protect every depôt and dockyard throughout the world ? ”

“ Sir Phipps Hornby and Sir John Hay both show that even when present programme is complete, we shall still be very far from strong enough at sea.”

“ Is this an encouraging time to ask us to put all our eggs into one basket, the Navy ? ”

“ But since it is admitted that until the Fleet is perfect, and indeed after it is perfect, there will always be a possibility of some of the enemy's ships breaking loose and escaping the blockading squadron of the superior Power, it follows that these ships, which may be of most powerful types, and may be found in any sea, *can only be prevented from making disastrous raids* on dockyards or commercial ports by the maintenance of efficient fortifications kept up to date defensively, and armed with effective guns.”

Replies.

protected by the fortifications of Eck-ness.

On the other hand, Lyons, in the “ Miranda,” proceeds thirty miles up a river to the fortified town of Kola (White Sea), with the purpose of demanding its surrender ; and he burns the place. But in all these cases the sea was commanded behind the attacking force.

The lecturer is wholly out of it in confusing the operations of a cruiser and a fleet.

Is Plymouth fortified against a cruiser ?

If so, the method is rather expensive.

What reasons ?

Reasons may have been given to show that light attacks will be made if not provided against by light defence on the spot.

But considering that the mere threat of an opposing fleet has kept our shores inviolate from heavy attacks for 300 years certain, it seems a large order to doubt its efficacy now, even with the abortive attempt on Bantry in full view.

Quite so.

But we dropped from our sea strength 1,600,000*l.* in the years 1887 and 1888, and we put on to our fort strength at the same time 3,000,000*l.*, and all that is to be dragged after it in the way of ammunition, garrisons, and supplies.

The only question arising is whether this was a wise proceeding. But no answer is given.

The object of my paper was to elicit such an answer.

I am not aware that I have made the request.

But I have asked to be shown the exact value of putting the eggs into the fortification basket. And I pause still for a reply.

The very first thing we should have to do on the outbreak of war would be (1) to watch the enemy, wherever we knew him to be, with at least equal force.

(2.) To concentrate remaining force at the points where our shipping congregates. And I say this, having been Chief of the Staff to the Commander-in-Chief in China when we were actually contemplating war.

In the first instance, there would be nothing else to do.

We should be bound to assemble at ports of call and coaling stations, and we

Extracts.

"The crucial test of the truth of this proposition is stated by Admiral Colomb to be the conduct of the French Baltic fleet during the Franco-German War."

Replies.

should not move thence except on intelligence of an unwatched enemy.

How can it be said that the *only* way of preventing disastrous raids on dock-yards and commercial ports is by fortification?

The inferior naval Power does not usually attack territory.

None of the Confederate cruisers ever attempted a raid on any port.

Even the "Huascar" confined her work to attacking the ships of the Chilians. She never, I believe, even bombarded a place. That was all done by the superior naval Power—Chili.

I made it no "crucial" test. I merely said the conduct of the French in the Baltic followed the clear rule of naval war.

A low opinion of my intelligence must have been formed if it is supposed I could have put such a statement of fact forward without full warrant.

My authority is René de Pont-Jest, who wrote in the *Moniteur Universel de Tours*, in November and December, 1870, clearly under the inspiration of Count Bouët-Willamez himself. The writer describes himself as: "... envoyé officiellement auprès du Vice-Amiral Bouët pour suivre les opérations maritimes." He describes how a council of war was held on the 12th of August, and a decision come to thereupon to bombard the fortified town of Colberg on the Prussian coast, which was one of the few places accessible to an ironclad fleet without necessary appliances for an attack on territory. Then he says—Bouët's fleet being in Kiøge Bay: "Il restait donc Colberg, et le Vice-Amiral Bouët se préparait à quelque démonstration sérieuse contre cette ville, lorsqu'il reçut le 13 Août, dans la nuit, une dépêche qui lui annonçait que la flotte Prussienne était sortie de la Jade et remontait la côte du Jutland pour pénétrer dans la Baltique." Then he says: "En présence de cette éventualité, le Commandant-en-chef de l'escadre n'hésita pas un instant; il rassembla à la hâte ses bâtiments et se dirigea vers le Grand-Belt pour s'opposer au passage des vaisseaux ennemis et leur offrir le combat."

De Pont-Jest then goes on to show that this turned out to be a false alarm, for that Admiral Fourichon was watch-

Extracts.

"In 1854 the combined English and French Baltic Fleets amounted to 18 ships of the line and 9 steamers. . . . The Admirals proceeded to attack the Aland Islands," &c.

Replies.

ing the Prussians with seven ironclads. After a pause the idea of bombarding Colberg was again taken up, and the fleet got as far as Arkona, anchoring there overnight, and intending to proceed to bombardment next day. Here they suffered much from a sudden gale of wind, and were in fear for the safety of the ships, especially the "Rochambeau." Then, says the writer: "La machine tint bon, heureusement, et le 'Rochambeau' parvint à rallier l'escadre, qui se dirigea sous Kioge-Baie. Colberg, une fois de plus, a été sauvé, car à peine au mouillage, le Vice-Amiral Bouët fut informé que l'escadre du nord était entrée à Cherbourg, que la Jade était débloquée, et que très-probablement la flotte Prussienne en profiterait pour pénétrer dans la Baltique, afin de l'y surprendre."

This is the most astonishing misstatement of fact. I will take the English Fleet alone. This consisted of at least—

(1.) 18 sail of the line, of which at least 12 were steamships.

(2.) 5 steam frigates.

(3.) 14 steam corvettes.

(4.) 4 steam sloops.

Ships employed at Bomarsund (English) were about—

3 steam line-of-battle ships.

2 steam frigates.

4 steam corvettes, and other steamers, leaving at least 10 steam sail of the line, 3 steam frigates, and 10 steam corvettes to watch a Russian Fleet which had not a single steam line-of-battle ship in its ranks, and only some nine small steamers all told.

But the wonderful infelicity of producing such a case can be readily seen on even a hasty perusal of Earp's "Campaign in the Baltic." It is there shown that notwithstanding the real impossibility of a sailing fleet of line-of-battle ships threatening the most numerically inferior group of steam line-of-battle ships, and notwithstanding the fact that Sir Charles Napier was informed by his Admiral in the Gulf of Finland, at the head of five steam and four sailing line-of-battle ships, that the westerly wind must prevent any move on the part of the Russians, yet he expressed himself to the French as seriously discomposed at the idea of their withdrawal from the second

Extracts.

"Take now the case of Gibraltar, as
"stated in Admiral Colomb's paper."

"Then there is the French invasion
"of Egypt in the face of the hourly fear
"of interruption by a fleet, which
"events proved was quite able to hold
"the command of the sea."

"If Count Bouët's action in the
"Baltic in 1870-71 was paralyzed by
"the inferior Prussian Fleet at Wil-
"helmshaven, what was the use to him
"of his command of the Baltic Sea?"

"A fortified base confers no advan-
"tage upon a fleet."

"It does not give freedom of offen-
"sive action . . . because the port
"not only requires to be locally pro-
"tected, but also to have its communi-
"cations kept open, and as the land
"defences cannot admittedly do this,
"they are utterly useless, and the fleet
"is just as much bound to the port as
"if there were no land defences."

"What we have admittedly to fear is
"the breaking away of one or more of

Replies.

covering force which he had apparently
assembled at Ledsund.

My own words were, "We may indeed
say that but for her fortifications
Gibraltar would not now be in our
possession."

Why slay the slain?

This is a wonderful misstatement of
the facts of history. (1.) Nelson
entered the Mediterranean with only
three sail-of-the-line, two frigates, and
a sloop on the 8th May, 1798.

We had then no other force in the
Mediterranean, and the rest of our
Fleet was tied up watching the Spanish
in Cadiz.

Napoleon was ready to sail, and never
knew even of these six ships, he had
seventy-two war-ships himself, and he
sailed from Toulon eleven days after
Nelson entered the Mediterranean, but
before Nelson had ever come in sight of
Toulon.

Nevertheless, so tremendous was the
risk, that on the 22nd of June, at night,
Nelson, then off Cape Passaro, actually
saw two ships of Napoleon's Fleet, and
if this seeing had only happened an
hour or two earlier, Nelson would have
perhaps captured or broken up the
whole expedition of nearly 500 sail.

He had not got the command of the
Baltic Sea unless the Prussian Fleet
was masked. The unmasking of the
Prussian Fleet took away from him the
command of the sea which was neces-
sary to permit him to make territorial
attacks.

I have never said this. On the
contrary, I showed how Brest and
Toulon always gave safety to the French
fleets.

The mistake is in supposing that a
fleet can be ready for offensive opera-
tions and afraid to leave an unfortified
base at the same time.

The thing is impossible. If the fleet
is strong enough for operating against
the enemy's territory, the fact is suffi-
cient to guarantee the safety of the
port it leaves behind.

But this fact will not suffice to keep
the port open, because the closing is
work which only requires light ships,
and therefore light ships must be pre-
pared at the port in answer.

There is no reason to particularly
apprehend the attack on undefended

Extracts.

"the enemy's powerful cruizers, who, if
 "there is any important port left un-
 "defended, will certainly make a raid
 "upon it . . ."

" . . . or else a temporary loss
 "of command of the adjoining sea by
 "some naval disaster; in either case
 "the port attacked will necessarily be
 "closed while the enemy is in the vici-
 "nity . . ."

Replies.

ports. These cruizers would attack shipping in preference, as much more profitable to them and injurious to us. And the ships escaped would have to be followed up, no matter what they were going to do.

This appears to be the nearest approach to getting on my ground.

I suppose it is meant that if the naval force stationed to keep a port open is attacked by a superior force and has fortifications to retire behind, it will be in a better position than if it had not.

According to the nature of the port and its geographical conditions this would be so, and any ports fortified on this principle would, I think, be reasonably fortified, provided the naval force is not stinted for the purpose.

Whether the port itself will remain uninjured is no doubt another question. If the enemy's naval force is superior in attack, it won't. The question will still remain just the same as ever, whether, seeing that the naval force is sufficiently strong will both protect the port and keep it open, and that the fortifications will in no case keep the port open, and may not be strong enough to prevent attack, it will not be better to increase the naval force and decrease the fortifications? This is a point open for careful consideration before money is spent either way.

Geographical conditions would probably govern; but a decision come to after so considering matters would be entirely what I would wish.

The whole question is confined to small ports and light attacks and defences.

If the attacks were heavy and required preparation and time, then the principle of the flanking fleet comes in.

But it is certain that it takes a good deal of fortification to stop a light attack by an enemy which has command of the sea. Witness the "Hecla" and "Arrogant" some 7 miles up a river at Eckness, in the Baltic, in 1854, and the "Miranda," at Kola, 30 miles up a river in the White Sea, as already mentioned.

I should say the question—the general question—in all such cases as this, is the mode of procedure in arranging the defence. I should say: First, the naval force necessary to keep the

Extracts.

“Suppose an enemy’s fleet shut up in Brest succeeded in forcing the blockade with even one or two powerful swift cruizers. . . . What then would happen? Why the blockading fleet must inevitably return with all speed to protect its threatened home ports, thus releasing the bulk of the enemy’s concentrated fleet for any mischief they can compass, while if those ports are secured by efficient local defences, they may be left in safety to their own resources; and the escaped cruizers *to the tender mercies of the cruizers of the superior naval Power.*”

“Imagine a blockade of Toulon with an unfortified Malta. What happens? We must, as is admitted, presume the possibility of the escape, at all events, of a part of the blockaded fleet; anxiety for the fate of his base at Malta, left to the mercy of an unknown force of escaped vessels, will undoubtedly raise the blockade.”

Replies.

port open; secondly, the garrison proper to provide against a *coup de main*; thirdly, the fortifications which may be proper to strengthen the hands of the garrison, and support the naval force in ease of superior attack.

Where I suppose we are wrong, is in using a different procedure and saying, 1st, the fortifications; 2nd, to assume no naval defence; and 3rd, to let the garrison come nobody knows where from. I have never seen anything but what assures me that we now go to work in this latter way.

This also seems an honest attempt to get on to my ground. But there is terrible confusion of thought and idea, generated, I think, in part by not understanding that when Admiral Baird raised the blockade of Berehaven because some ships had escaped, he feared not an attack on his base—Milford Haven—but a superior force attacking Admiral Rowley’s fleet.

Blockading battle ships do not raise the blockade of battle ships because cruizers have escaped. You might as well break up the camp of an army corps to intercept a squadron of cavalry.

The cruizers that you must station to keep your ports open would protect them from cruizers’ attack.

And this the lecturer himself declares in the last sentence.

No one that I know of wants to unfortify Malta—but a great many think that enormous sums are wasted on Malta fortifications from not understanding the conditions of naval war.

If Toulon were blockaded, there must be naval force left at Malta to keep it open, else it may be blockaded by the light forces of the enemy. Therefore, whether fortified or not it would not be open to light attacks.

If the Admiral off Toulon finds that heavy ships are escaping, his fear could not be Malta, even if Malta were only lightly fortified—it would hardly be Malta if Malta were not fortified at all. In the first case he would know the enemy would not attack Malta for fear of being caught by a detachment of his ships. In the second, heavy ships would not be sent.

What he would fear would be some combination to attack some other British Fleet—that off Brest perhaps.

Extracts.

Speaking of the supposed advantage which the superior naval Power has of refitting under fortifications, which I have shown that history does not claim, he goes on: "This is, in fact, one of those points where a failure to bring prominently to notice the altered conditions of naval war vitiates the entire argument."

My expression "attack from the sea."
 "I understand Admiral Colomb has explained this away by saying he meant by attack from the sea, an attack by troops landed from ships, as, for instance, at Sebastopol."

Replies.

He might very likely detach a force to Gibraltar with orders, if the enemy had passed, to follow him up and to reinforce the Brest Squadron.

If Malta were unfortified and the Admiral found light ships escaping, he would very likely secure Malta by sending some light ships to reinforce those already keeping Malta open. But he would be much more afraid that the ships escaped were after commerce.

If his fleet were properly prepared for modern blockading operations he would know what vessels had escaped.

This is not very wisely said. Bouët-Willamez, in the Baltic, had his open bases at the Great Belt, and at Kiøge Bay, following the old practice exactly. He was aware of the dangers of raids and was somewhat inconvenienced by the necessity of having a guard ship when he was so short, but that was all. And Bouët had no sort of proper force for blockading.

It is well known, as I said in my paper, that one of the reasons why Port Hamilton was abandoned was because for the blockade of Vladivostock it was too far off, and it was preferred to have an undefended base nearer. Malta would be too far off to be the base of the blockading fleet off Toulon, though for repairs and docking it would be used.

I have never explained the words away, for they were carefully chosen words, long used by me, and still used to express the same idea.

I have explained only that the words meant what they said, and could not be supposed to mean something else.

I have not said that they meant "an attack by troops landed from ships." If I had meant that, I would have said it. But I have said that the words were chosen in order to cover the invasion of the Crimea.

The words mean what they express exactly, namely: every form of attack which can be made from the sea with the object of reducing the place: and they cannot be narrowed.

But even then my words are misquoted. I am made to say "Fortresses have never successfully resisted an attack from the sea."

I spoke of the experience of steam wars, and said, that in steam wars

Extracts.

"The most hazardous statement made by Admiral Colomb is that contained in his letter to the 'Times' of 11th March, in which he endeavoured to prove the superior durability of ships to forts, with a view to showing the absurdity of spending money on the latter."

"The ships built, beside the Martello towers (before Waterloo) lent themselves to the discoveries of science," &c.

"The fortifications of 1859-60, &c., are now things of the past."

Replies.

"They (fortifications) have never stood a determined attack from the sea; they have never given, or restored the command of the sea; but they have sheltered beaten and inferior fleets, small and large, just as they did in times gone by."

What I should have liked to have had is, cases in steam wars that I may have missed, where determined attacks from the sea left the attacked place intact when peace came.

I had in my mind the fall of Sebastopol, and the astonishing power of the attack from the sea, shown in the American Civil War.

I did not care to press the conclusion too far, but it certainly seemed, and seems, to me that there were no parallels for these things in sailing naval war, and that steam seemed to have wonderfully facilitated the attack from the sea on fortified places.

I did not endeavour to prove the superior durability of ships to forts; I had no view of showing the absurdity of spending money on the latter—both of which things are plain on the face of the letter.

And the lecturer has interpolated two words—"before Waterloo," when ostensibly quoting me, which I did not use.

Lord Randolph Churchill had written a letter to the "Times" opposing the naval programme, and declaring that the ships would be obsolete immediately, and instanced the case of fortifications to prove it.

I wished to meet this argument by showing that ships did not really grow obsolete as rapidly as he claimed. It was Lord Randolph, not I, who made fortifications the standard of comparison.

I was thinking of the "Hastings" 74, designed and laid down in 1819, the ship I served in in the Baltic; and of the "Russell" 74, laid down in 1815, our "Chummy Ship" as the blue-jackets called her. Both of these were then steamers.

But the words "before Waterloo" are not mine, for my impression was, and is, the building of Martello towers was continued long after 1815. In this I may be wrong.

I have no knowledge of fortification—I have made no study of it, and do not

Extracts.

"It will no doubt be most advantageous, as has been recently pointed out by a distinguished naval Officer, to have ports secured by coast defences, into which ships" (trading ships) "can run if pursued, where they can assemble in security, waiting convoys," &c.

"If, then, Admiral Colomb's conclusions are wrong, wherein lies the fallacy of his argument? It is, I think, two-fold; in the first place, the command of the sea claimed for the superior Power is an absolute command at all times and in every place, no possibility of weakness or failure is admitted."

Replies.

presume to express an opinion on so technical a matter.

Captain Stone had read a paper devoted to proving—as I understood—that the fortifications of 1859-60 were obsolete, and I gathered that to be the view of the large military audience which listened. So I was not surprised to hear Captain Stone, at the reading of my paper, sum up his views by saying that these fortifications were "things of the past," and I was not surprised that the lecturer, who spoke after him, did not at once contradict him.

I know nothing of these things, and did not myself assert anything but what was said. I put the words "things of the past" in inverted commas to show that they were not mine.

On a military subject I bow entirely to military statements, but I cannot correct them if they are wrong.

How are ships to run into a blockaded port which, by the hypothesis, is the condition?

If the fortifications of the port are in operation, there must be an enemy present and that enemy will blockade the port.

What good was Fort Fisher to the blockade-runner captured or run ashore before she got to it?

Fort Fisher prevented the Federals from possessing themselves of the port for some time, but it did not help the trader to run the gauntlet of the Federal ships.

The traders to Charleston would have thought it very odd policy if the Confederates, having the power to drive the Federal ships off, preferred to leave the Federal ships blockading, and to prevent them, by fortifications, from doing more than blockade.

My conclusions are only those of naval history; that is, as is so well put by Mr. Laughton, of naval "experience." The lecturer has only challenged one of my statements on this head—the experience of Bouët-Willamez. I presume he is now sorry he did so.

The argument that the superior Power is to have, or can have, "an absolute command at all times and in every place" is not the experience of history, and would contradict the facts set out in my paper. It, therefore, cannot be mine.

*Extracts.**Replies.*

My conclusions, as I understand them, go no further than to say that on these questions of the defence of the Empire we should still think as our forefathers thought, and that those who spoke, wrote, and acted amidst the realities of naval war, are much better guides to follow than those who clearly show that they have made no study whatever of naval war, who distinctly avow that the whole thing is so altered—yet without showing how and why it is altered—that we must defend ourselves by guess and imagination and not by the light of experience.

I have no conclusions apart from experience, and in my paper, any conclusion of my own put forward, is done in a tentative way, supposing that while the facts I have collected all point in the direction indicated, there may be others which I miss, showing the reverse.

Not a single such fact has as yet been presented to me from any quarter, only a great store of fact supporting my tentative views.

I am trusting to other debaters to bring out fully the language of those I follow, and especially to compare the language of the Royal Commission of 1786 respecting the then proposal to fortify Portsmouth and Plymouth, with that of the Commission of 1859 on the same subject.

It is a pity that my words should be continuously altered and paraphrased. I must say over and over again that they are carefully chosen and will not bear to have their sense changed.

My real words are, "We seem to be met by the conviction that fortifications can only represent delay."

I have not the least idea of dogmatising on the point, though I necessarily approach dogma when I find no facts brought forward on the other side.

What about the defence of London?

What then is being done with the 3,000,000*l.* borrowed last year?

Are we sure that it is not mistaken ideas on the question of defence which produce the anomaly of the greatest Navy in the world costing only 14,000,000*l.* a year, while a numerically small army costs 20,000,000*l.*? Fortifications *alone* may be cheap, but I doubt if any of us know what money they draw after them.

"What, then, is the *rôle* of fortification? It is only delay, says the gallant Admiral, and this, in a general sense, we may accept."

"There is no enormous expenditure taking place, there are no gigantic works being erected."

Extracts.

"It will, I believe, be found that the naval opinion in cases of difference was generally in favour of more extensive defences than those undertaken, which were watered down to suit the extravagant soldiers."

Replies.

I think this is most probably true. It is only quite recently that naval men have begun to study the experience of the past in order to draw present lessons. And they have not been aware that all the great men who made this Empire took the views that I take now.

It would not have been possible, for instance, for the naval men who were on the Royal Commission of 1859 to have signed the Report, if they had had the Report of the Royal Commission of 1786 before them.

They could not have agreed to report on the basis of an insufficient fleet at home. But, the Report having been made and accepted, the naval official position has been that noticed by Sir Arthur Hood in the Fourth Report on the Navy Estimates, 1888.

He was asked whether before the Estimates were framed, "there was laid before the Board of Admiralty, by any expert, a complete scheme, showing what were the requirements of the country so far as the Navy was concerned?" And he answered, "No, I have never known such a scheme to be ever laid before a Board of Admiralty." (Q. 4167.)

This would have been considered a strange answer half a century ago, but we have been used to think it not strange because of the general acceptance of the idea put forward for the first time by the Royal Commission of 1859, which is that you must fortify on the understanding that there is no naval force.

From this it was but a deduction to think that defence was a War Office business depending on forts and garrisons, and which the Navy was to shake itself clear of.

And the Navy has never thought that the cost of fortifications and garrisons came ultimately off its own back in a sort of compound interest.

Say that forts and garrisons were established because the Navy was considered unequal to the task of defence. Some of the money to establish them was taken off the already weak Navy. The Navy thus further weakened enhanced the necessity of more forts and garrisons, and some of the money was again taken off the Naval Vote;—and so it is possible to go on in a continually vicious kind of argument till we either overburden the country with expense, or leave her in a dangerous situation.

Extracts.

"It has been pointed out that a maritime frontier is in its nature pierced by well-defined passes, and impassable at other points—the mountain passes being represented by the harbours, estuaries, or beaches along the coast suitable for the disembarkation of troops."

Replies.

It is obviously impossible to settle the naval requirements unless we first settle what our existing sea-faced forts and garrisons are going to do for us.

If the views we now hold are right—I mean if the views opposed to mine are right—then we may want more forts and garrisons, and less Navy.

If the great men whom I wholly follow were right when they lived, and laid down principles that are right now, then we may want less works and garrisons, and more Navy.

But it is clear we ought to settle it either way before we begin to spend the money.

I have never heard this simile used, and I should be glad to know who used it, for it seems to me a strange one.

But it has a curious family likeness to one I have often publicly used, namely, that the *enemy's coast as a maritime frontier* is like a mountain frontier, and his war ports like the passes out of which his forces issue.

Adjourned Discussion.

Thursday, May 9, 1889.

GENERAL G. ERSKINE, Chairman of the Council, in the Chair.

The CHAIRMAN: I am sorry to have to inform you that it was impossible for the Adjutant-General of the Forces, who presided at the reading of Major Walker's paper on Wednesday of last week, to take the chair again to-day. He has some important duties which prevent him from being here. In his absence the duty of taking the chair has devolved upon me. We are now about to resume the discussion on the paper read by Major Walker, or perhaps, inasmuch as that paper was a stringent criticism on the paper read on the 1st of March by Admiral Colomb, I may say more correctly that we are about to enter upon a fourth discussion of Admiral Colomb's paper. However that may be, there can be no doubt that we have to discuss a very important question. I have to remind you of the rule of the Institution that speakers must confine themselves to ten minutes, and it is important that we should adhere to that rule, as I believe there are a good many gentlemen who wish to express their opinion.

Colonel C. BRACKENBURY, R.A.: Admiral Colomb, with that extreme modesty which is his distinguishing characteristic, compared himself the other day to David defending the children of Israel against Goliath of Gath. But that illustration was not exactly applicable. In the old story it was Goliath, not David, who was the challenger. I am not aware that either Major Walker or anybody else has challenged the increase of the Navy. On the contrary, I believe that every soldier would do everything he possibly could to obtain it. It appears, therefore, that Admiral Colomb in this case is the attacking party, for he most distinctly attacked the expenditure of money upon fortifications. He will probably say "not

upon some fortifications, but upon others." I must honestly confess that, instead of David and Goliath, he reminds me much more of a cartoon that I saw the other day in which an elephant was trying to hold an eel. It is excessively hard to get hold of what Admiral Colomb really means. I hear his lectures and speeches in this theatre. I read his utterances in the papers, and the articles which are founded upon those utterances, but his explanations are so numerous that I fail to know what he really does mean. However, it is clear that at any rate of this great scheme which has lately been arranged for the defence of the Empire, he attacks that part which provides for fortifications. And this again reminds me of an illustration. The great Jesuit missionary of China, M. Huc, tells how the Chinaman, when he is very sick, sends for a doctor and gets a prescription, every ingredient of which is necessary to make a good medicine. Then he looks over the prescription and says, "What does each item cost?" and if he finds an expensive item he scratches it out, and says, "I won't have that." Well, now all the doctors, naval and military, have put their heads together and prepared a good prescription for the defence of the Empire, which includes ships and fortifications. Why not adhere to it, and why take out one part of the scheme because it costs a certain amount of money? Take care that we do not act like the Chinaman. Every soldier would agree that over-fortifying is a bad thing, and the great reason why over-fortifying is bad, and has always been acknowledged to be bad by strategists, is that it locks up in fortifications troops which would be more useful in the open field. Well now, I ask in this particular case what would the proposal of Admiral Colomb do? The fortifications would be garrisoned as everybody knows almost entirely with militia and volunteers. On the other hand, for the defence of those ports by ships alone, you would have to use some of the finest vessels in the Navy. You would, therefore, be locking up your mobile forces by Admiral Colomb's plan and not by the other. Surely the ships are for the defence of the Empire, and are the most movable and the most powerful elements of that defence. The essence of the Navy is mobility, but to have complete mobility, to be able to go out over the whole world, meet the fleets of an enemy and destroy them, the ships must have a secure base behind them to which they can return. With proper fortifications the fleets would be able to roam and defend our commerce; they would be able, supposing an enemy sails to the east or west, to follow him and attack him there. But if they stick entirely to the defence of our home coasts, what we are doing is to lock up like garrisons the finest mobile forces which we could possibly possess. There is a great strategical danger which Admiral Colomb himself has mentioned in speaking of the French fortifications—namely—that of spreading the defence over a large surface or a long extent of line instead of concentrating the defence for attack or counter-attack, as the case may be, on one particular spot. Everybody knows that to be very bad management; yet according to the schemes which I understand Admiral Colomb to propose it seems that he would have his fleets scattered. He would have some fleets blockading, and we saw only the other day at the naval manœuvres, what very little chance they would have of blockading with any satisfactory result. One enemy gets out, he goes and strengthens another enemy, and that one gets out too, and very soon you have your own fleet dispersed in various places with the concentrated fleet of the enemy able to attack you in detail. Admiral Colomb appeals constantly to history, and he is perfectly justified in doing so. I appeal to history too with reference to one of his great propositions, that of cutting off the food-supply of the nation, and would ask him when has it ever been done? Can he in any portion of history or any era refer to a time when a whole nation has been deprived of its supplies until the ports of that nation were occupied by the land forces of the enemy? Another interesting question is with regard to the flanking fleet of which Admiral Colomb speaks: he says that no enemy can attack if he has any idea that there is a flanking fleet near him; I think the statement was within 700 miles, or at any rate a case was quoted in which at 700 miles a flanking fleet was supposed to prevent the attack of another fleet upon land fortifications. Now I am very much surprised to see that one very interesting incident has been left out of account or only glanced at, the one example in history of the meeting of two ironclad fleets; I refer to the Battle of Lissa, where the Italians, knowing that the Austrian fleet was within a day's sail, still attacked land fortifica-

tions. It is quite true that the land fortifications beat them off, as I hope they always would do, and certainly ought to do; but at the same time that had nothing to do with the Austrian fleet. I happened to have the advantage of knowing a great deal about that battle, because, although not actually present at the time, I was with the Austrian fleet immediately afterwards. I went over, under Admiral Tegethoff's care, every ship in the Austrian fleet and talked to every Captain. I then crossed to Ancona, and went over the Italian fleet in exactly the same way. The Italian Admiral was kind enough to send me round with his Flag-Lieutenant and allow me to talk to every single Captain of every ship, and from not one of those Captains, either Austrian or Italian, did I hear a single word about the danger of the fleet on the flank. I heard a good many criticisms as to how the battle was lost, but not any reason why they should not have attacked the fortifications. What we soldiers want to do, so far as I understand, is not by any means to take a single ship from the Navy, or withdraw from them one penny which they can possibly get out of the country to spend upon the Navy. The present scheme for the Navy does not even appear to us sufficient from our soldier's point of view, and what we want to do is to come to the aid of the Navy as much as we can, and not so much for the Regular Army to stand within fortifications, but for the militia and the volunteers to aid the fleets, forming as they will the garrisons of the great fortresses, and in that respect standing behind the Navy so as to secure its base of operations. This seems to me the only way to make the greatest possible use of the forces of the Empire. I have only one more word to say, and that will be, if the lecturer will allow me, a word of criticism on his admirable paper, which is, I think, one of the very best I have heard in this Institution. It is with regard to something contained in the very last paragraph, where he is too much down upon a very fine fellow indeed, whom we call John Bull. It seems that many of us are inclined to say that John Bull is extremely stingy and that he won't put his hands in his pockets, that he does not know his own interest, that he will not give money for the Army and Navy. One of the wisest men in Europe, Mr. Delane, the editor of the "Times," who honoured me with his friendship, used always to say, "Do not imagine for one instant that John Bull refuses any money whatever as long as you can only prove to him that there is sense in its payment. If you naval and military men will agree upon any expenditure whatever, and show that it is for the good of the Empire, and not for placing comfortably younger sons, you will find that John Bull will be perfectly ready to pay it whatever it may be." The whole of the Press has lately shown an almost undivided feeling; there has been hardly a dissentient voice; Parliament has spoken almost as clearly though not quite; as far as John Bull is represented by the Press and by Parliament, it is perfectly clear that he is ready to give the money which is required. Only if we soldiers and if Admiral Colomb will rush to the papers and we contradict each other, one side swearing that we do not want fortifications and the other saying that we do, how on earth is John Bull to know which is right? "If the trumpet gives an uncertain sound, who shall prepare himself for the battle?"

Admiral Sir R. V. HAMILTON, K.C.B.: In my reading of history, littoral fortifications have invariably been the resource of the weaker maritime Power against the stronger. To go back three centuries ago, Spain undoubtedly had every right to call herself the mistress of the seas, having not long before almost annihilated the Turkish Navy at Lepanto, and she monopolized the commerce of the world; in 1587, the year before the Spanish Armada, Drake sailed into Cadiz, and destroyed the fleet which was assembled in that port for the purpose of invading England. Two centuries after that Cadiz was well fortified. It was blockaded by Nelson, but Nelson never dared to attack the fleet which was in that port, so that in that instance fortifications were an assistance to the weaker Power. Again, go back to the wars at the end of the last century and beginning of this; while the French coast bristled with batteries, the English coast had only a very few round it, and the concentration of the troops and flotillas for the invasion of England was only rendered possible by the French vessels being able to creep along close in shore under the protection of their batteries. But for those batteries they could not have gone from port to port; had the French been the stronger maritime Power, their concentration would have been effected without the aid of those batteries

and under the protection of the Navy. Colonel Brackenbury has said that one objection to having too many forts is that it weakens the Army. There is no doubt about it. The Peninsular Campaign could never have been fought but for Trafalgar, which left us mistress of the seas, and enabled the English Army to carry out their operations without any fear for their supplies or of losing their base. With regard to fortifications I will read the words of Raleigh. Raleigh's counsel prevailed very materially in the Council held for the preparations for repulsing the Spanish invasion. He was a soldier. He was Military Commander for the West of England, and he said that without her fleet England could not stop that landing: "We say that an army to be transported over sea, to be landed again in an enemy's country at a place left for the choice of the invader, cannot be resisted on the coast of England without a fleet to impeach it, nor on the coast of France or any other country, except in every creek, port, or sandy bay they have a powerful army to make opposition." There is no doubt that you cannot prevent a hostile army being landed in any country, unless you have a very superior army indeed, and even then it is very doubtful. I perfectly hold that our naval arsenals and coaling stations must be defended. We want these forts and guns to protect the area in their immediate vicinity when our ships are away, protecting what Sir John Colomb calls "the wider area." A squadron might chase away the enemy's ships, and being drawn away from the port, one of the raiders might turn back and destroy all our coal stores if unprotected by forts. Lord Howe says: Without a well appointed and commanding navy the British Army and lofty spirit of Britain would be confined to their own shores at home, and become powerless and unknown abroad; their commerce would fall into decay, pass into other hands, and we should be once more reproached as the Britain *toto ab orbe exclusi*, instead of, as now, feared and respected in every part of the world." I think in that respect there can be no doubt, and in strengthening the Navy so as to ensure the command of the sea, we also strengthen the Army, so that it is ready for offensive operations out of the country. I should now like to offer a few remarks upon the lecture, though I suppose in doing so I shall incur the odium of the lecturer, and also of his opponents, because I do not agree with either of them on the whole. That being the case, I am very glad to see a distinguished infantry Officer at the head of this meeting, who will probably hold the balance straight between the fortification and the naval fads, as he knows both Services thoroughly. The lecturer says the British Fleet is not sufficient, because: "In 1810 we had 664 cruisers at sea as against 105 in 1887, and though 19 of the enemy's cruisers were captured in less than a month, still in one fortnight 20 of our ships were captured by the enemy close to our coasts." That is perfectly true. Fleets can no more be everywhere than can the police, and yet we must admit that the police have the burglars and murderers pretty well in hand on the whole; and so did the fleet, as we may judge from the fact that our exports and imports increased from 46,000,000*l.* in 1792 to 90,000,000*l.* in 1815,¹ therefore I apprehend that our naval police had very good hold of the sea-burglars. This increase was accompanied by the total ruin of the trade of France, and that of most of our enemies. During the two years of war with the United States, from 1812 to 1814, their commerce diminished from 50,000,000*l.* to 4,500,000*l.*, and two-thirds of their traders and mercantile classes were insolvent. Ours on the contrary increased from 64 millions to 87 millions. Now I will ask the lecturer would any amount of fortifications have saved the capture of those twenty ships, or could they in any way have added to our commercial greatness or the corresponding depression of our foes who were inferior to us at sea? Admiral Colomb has dwelt upon the fallacious conclusions drawn by the lecturer from the Baltic Fleet; in that respect I quite concur with the Admiral. I will not make any further remarks upon it, beyond simply saying the Russians were far too wise, with twenty-two sailing ships, to come out and attack the Allied Fleet of eighteen ships, of which twelve were steamers. Our fleet was far more effective than theirs, although inferior in numbers. The game of Russia was that Sir Charles Napier should knock his head against the stone walls of Cronstadt or

¹ Allison, 1815-52, vol. i, chap. 2.

Sweaborg, and that they should then come out with their fleet to attack him when disabled, but he did not fall into that trap. I do not think the lecturer's illustration of Napoleon's invasion of Egypt a happy one. The defeat of Napoleon before Acre and the ignominious capitulation of the French Army arose from the French having lost the command of the sea. They were cut off from their supplies and base of their operations. The Adjutant-General of the Forces has made several successful attacks upon Coomassie, Zululand, and Egypt, but I should have liked, if he had been present, to have asked him if he would have made any one of those attacks unless he had been perfectly certain that he had a naval base of operations to maintain his supplies, and to fall back upon in case of necessity. Malta was never besieged. It was blockaded for two years by sea and by land, and fell ultimately from starvation. I should like to ask the lecturer on that point, how long would it have held out against a regular siege, and what sized army would have been required to besiege it in that day? Because I think it is very important with regard to naval operations to know this. I myself suppose that an army of 25,000 or 30,000 at least, with a siege train, would have been, and would now also be, required for the purpose, and if the siege had taken any long time it is very certain that we should have regained the command of the sea, and the invading army would have been annihilated. Another remark he makes is why did not the British Fleet attack the French maritime fortresses? As a R.E. he should know they could only have been taken by a combined naval and military attack. Fleets are built to attack fleets, not fortresses. There are, however, exceptional cases in which they have successfully bombarded forts. The remarks of Admiral Farragut in the United States Civil War are conclusive on that point. He says: "We could pass and repass the forts (in the Mississippi), and have done so, and can do it again when required, and can shut up their fire as often as we like, but we cannot capture them without land force." Another great point made is "that steam is not in our favour." I hold most strongly, and I believe most naval Officers will agree with me, that steam, so far from bridging the Channel, has given us the greatest facility for its defence. There could be no such thing in these days as that Protestant wind (as it was called) which enabled William of Orange successfully to land on our shores. There could be no such thing as the various chances which happened to us when the French landed in Ireland. No matter what the wind is we could certainly insure our Fleet being on the spot in a very short time, and in that respect I agree with Admiral Colomb's argument about the flanking fleet being an almost infallible defence of the country, whether superior or inferior. The lecturer mentions the difficulty of landing on an enemy's coast: as he has dwelt on Napoleon's invasion of Egypt, I would remind him that Sir Ralph Abercrombie landed in Egypt, although some of the boats were capsized, and crews drowned, without the ships being able to get near enough to support the landing, and this he did in the face of a superior army. The lecturer also speaks of certain differences between the Army and the Navy. I am happy to say these differences of opinion only exist in London, for the moment we get away from here, and have to act together, there is only one difference between us, and that is a feeling of rivalry as to which shall most effectively support the honour of the country.

Admiral Sir E. FANSHAWE, G.C.B.: I wish to make a few remarks upon those parts of Major Walker's paper which refer to our defences against the invasion of this country. Major Walker, in the first part of the paper, expresses his belief that there exists throughout England a very widespread superstition, arising from our insular position, which leads Englishmen to place their entire dependence upon the sea alone as a defence; and he is so confident of this that he thinks it is a fact that the average Englishman regards with the unreasonable suspicion of prejudice and ignorance all those who would enlighten him as to the folly and danger of this exclusive dependence upon the sea. I think Major Walker is mistaken in this belief, because we have seen, during the last thirty years, many hundreds of thousands of Englishmen enrolling themselves as volunteers, with the entire sympathy and approval of their countrymen, for the very purpose of forming a system of land defence entirely independent of the sea defences. But, further on in the paper, Major Walker sketches, with all the precision and clearness of a syllogism, a system of invasion of England from which sea defence is altogether and entirely excluded.

He says that maritime countries afford peculiar advantages to an invading force, because the invading army is able to cross the sea in a compact mass to the shores of its enemy, and that it derives additional facilities in the case of an attempted surprise. England is a maritime country, and the inference is that England affords the advantages to an invading army here specified. The fallacy is so transparent that it is hardly necessary to point out that it consists in including England in the general premiss, whereas England is altogether exceptional, and excluded from it, by the fact that England holds the mastery over the seas that surround it by means of a superior naval force, which is capable of preventing any invading army from approaching its shores at all. But from this fundamentally unsound basis Major Walker draws his conclusions; the first of which is that we must fortify all the harbours and estuaries of our coast, which are specially available for the landing of an enemy, and which that enemy might select as being conveniently situated for his ulterior objects. There are other inferences drawn, but throughout the whole argument there is not the slightest indication whatever that England possesses so much as one single gunboat upon the sea. I will now advert for a moment to that part of the argument in which Major Walker draws a comparison between this facile invasion of England and the more difficult invasion of a country with a mountainous land frontier. I do so for the purpose of pointing out that the Commander of the invading army in the latter case will guard and maintain with the most scrupulous and jealous care his communications with the base from which he derives his supplies. But if any fraction of the army intending to invade England could get ashore here, it would find itself face to face with a bitterly hostile population—with the whole resources of England of every description (I hope previously well organized) concentrated against it, and with its communications hopelessly and irretrievably cut off. In that condition I submit that we may with confidence leave it to be dealt with by the military forces in England. I will only make one more observation. If it be an error—and I think it is a very serious error—to allow our just and confident trust in our naval defences to deter us from organizing in the most efficient manner the land resources of England as a subsidiary force for repelling invasion, it is an immeasurably greater error—a monstrous and fatal error—to ignore, or in the slightest degree to underrate the value of, or not to take every possible means to make perfect, the naval defences of the country.

General Sir LOTHIAN NICHOLSON, K.C.B.: I confess that I rise with extreme diffidence and some hesitation, for Admiral Colomb's explanation and re-explanations have somewhat puzzled me. As I said on first addressing the meeting when the original paper was read, the reduction was one which was *ad absurdum*. The conclusions which I drew then appear to me the conclusions which I shall draw now. Admiral Colomb proposed a theory which I maintain if carried to a logical deduction would lead to the disarmament of our fortresses and the entire demolition of the land forces. (Admiral Colomb: No, no!) That is the conclusion which I arrived at from his original paper. I maintain that that was a just conclusion, though I am answered with "No, no." I still maintain that that is the case, but I am glad to see that Admiral Colomb has somewhat retreated from that position. He began his answer to Major Walker by saying, "I do not myself deny, and I never met any one who did deny, the utility of permanent fortifications." That appears to me to be the whole of our argument; we maintain exactly the same theory. I am perfectly in accord with Sir Vesey Hamilton in every word that he has said, and I am quite certain that there is no military man in this room who does not agree exactly with what Sir Vesey Hamilton has laid down. Beyond that I maintain that if Sir Vesey Hamilton had given this lecture instead of Admiral Colomb, upon the lines which he has laid down now, there would have been little, if any, discussion upon the subject. I accept everything that Sir Vesey Hamilton has said. I accept the fact that the defences of the country are simply to back up the Navy under certain conditions. That is all we say; we say that under certain conditions the defence of commercial ports, of coaling stations, of military ports, is absolutely essential, and we maintain that under certain conditions these fortifications are justified. They are justified, I believe, by the majority of naval men: they are justified entirely by military opinion; but here I would beg leave to say that there is no question of rivalry between the Services. There is a feeling that

words have been used in this theatre to show, or to try to prove, that something of the sort is in existence. Now I maintain that as between the Services there is absolutely no rivalry; we all want to arrive at the same conclusion. We all want to find out what is best for the country; we all want to find out what is the best way to spend the money which John Bull will give us, even if we expend money upon fortifications which most of us perhaps would say would be better spent upon additional ships and strengthening the Navy. But, at the same time, I do believe that you may aim at an Utopia with regard to the Navy, and I believe that if you carry out Admiral Colomb's argument you do desire such an enormous increase of the Fleet that the country will never stand it. (No, no.) That is a matter of opinion. I believe, if Admiral Colomb's argument were carried out, you would require three fleets—three classes of vessels. You would require, first of all, large standing fleets to repel the incursions of the large fleets—combined fleets, mind you; do not let us think about one enemy: let us think of half-a-dozen enemies, that is what we have to be prepared for. It is not that we have only France: it is that we have a possible combination of Russia, France, and possibly a third. That is the position, gentlemen: it is not that we have got only to go across to Brest or to Dieppe, or to one of those places, and blockade them there, but we have to think of a dozen other places besides; so that I say, if Admiral Colomb's argument were carried out, it would be necessary to have separate fleets to repel possible enemies. He would also require a number of cruisers to keep open the distant communications within a certain zone with our commercial and military ports. And, besides that, we should require a third fleet, which it would be necessary to locate more or less in home waters. That is, I believe, in Admiral Colomb's mind. He shakes his head; well, very often he shakes his head to very little purpose, because, generally speaking, he climbs down from his position; that is the impression on my mind. I ask you, is it in the least likely that the country will give you three fleets? Now I maintain that the fortifications of this country are intended to take the place of the fleets, which must be maintained for the special protection of the ports and dockyards. I do not deny that it is absolutely imperative to this country to have a fleet strong enough to withstand the fleets of three or four combined nations at war against us. I do not deny that it is necessary to have cruisers to keep open communications with our ports, but I do say, in the exigencies of the present time, the chances that swift cruisers give an enemy of getting behind our first line of cruisers would oblige us to place our ports and our commercial centres in a position of absolute safety; and I say that light fortifications, such as we are now putting up—not the iron forts of years ago, I do not maintain that that is the proper way to do it—but the light fortifications we are using at present do comply with the exact principles that Admiral Colomb lays down. I do not want to detain the meeting beyond my limit of time, but I should like to refer to what Admiral Colomb has contended here. I beg leave to say I do not intend or wish to go into any detailed criticism of Admiral Colomb's paper. I wish merely to point out one or two things. He says: "The whole of the great commercial ports have recently joined to urge the Government to erect fortifications, rejecting with contumely the Government counter-proposal to introduce local naval defences to keep the ports open." A paragraph which follows shortly after that is as follows: "It is perfectly well known for some years back the Admiralty has systematically refused to concern itself with any defence of territory, and it is allowing at this moment all our great commercial ports to be prepared for the closure by submarine mines." That appears to me an extraordinary admission. In one place he says that the commercial ports reject with contumely the Government proposals, and in the other he says the Admiralty systematically refuses. That appears to me to be a contradiction, and perhaps Admiral Colomb in his reply will be good enough to explain it. We know perfectly well the commercial ports have refused. Sir Vesey Hamilton and myself were united in a most friendly way in making these proposals to the commercial ports, and they did certainly, speaking generally, refuse to accept our proposals. As I understand from Admiral Colomb, he rather sums up his argument in these words: "First, the naval force necessary to keep the port open; secondly, the garrison proper to provide against a *coup de main*; thirdly, the fortifications which may be proper to strengthen the hands of the garrison and support the naval

force in case of superior attack." I rather agree that that is the line, but it is a very difficult thing to get other people to agree to it too. We should like above all things that the Navy and the Admiralty should agree upon this point, but we cannot get them to do it; that is one of the difficulties, but I do not go so far as the lecturer in the second paragraph, in which he says that we must first of all consider the fortifications: secondly, we are to assume no naval defence: and, third, we have to let the garrisons come nobody knows where from. Well, now, in the first place, the fortifications are based upon certain well-considered ideas; secondly, we do certainly not assume that there is no naval defence, and I do not know anybody who has ever come forward to make such an assumption. I have never heard anybody in this room, or out of it, ever assume that there is no naval defence. The next says: "Where are the garrisons to come from?" That is a point upon which Admiral Colomb is mistaken. I have no hesitation in saying, if he had consulted with the military authorities at the Horse Guards, they would have told him that the garrisons are considered, and that the object of the fortifications is not that we might shut armies up, but that we might let armies loose. That is the great object of fortifications, and I am sorry that a man for whom I have so much respect as Admiral Colomb should have treated the soldiers' argument in that way. Fortification has for its object the setting a field army free. The object of fortifications is, as far as I understand it, to so protect your point of defence as to use as few soldiers as possible, and I maintain that that is the line which we take. We also maintain, as far as I know—and I have some means of knowing what are the theories upon which we act—they may not be perfectly sufficient ones, and I may not be the best expositor of them, but I shall maintain that no fortress is put up, and no battery erected, without, in a certain measure, considering who are the people to have the defence of it. That may not be done in sufficient depth; we must go deep enough into that question, but I absolutely deny that the question of the garrison of fortresses is entirely ignored. I am sorry to have detained you so long, but the subject is an important one.

Colonel A. MONCRIEFF, C.B.: Mr. Chairman and gentlemen, I have a few remarks to offer, although the subject in some cases has been touched upon by those who have preceded me. With regard to this most important discussion I feel convinced that the views of those who have approached the subject from a naval point of view and those who approached it from a military engineer's or land service point of view are much nearer—much more in accord than appears upon the surface. The difference of view which has been brought out so sharply is in my opinion superficial, whereas the agreement is fundamental. Indeed it is but one great subject, and whether approached from one point of view or the other, the land and the naval part of the problem are merely supplemental to each other. I think we ought to feel very grateful to Admiral Colomb for coming forward and stating his case from a purely naval point of view—which is a novelty—in my humble opinion, however, it is from that point of view that this subject can alone be safely approached, although it is generally from the other point of view that the question is taken up, but Admiral Colomb will, I trust, excuse me for expressing my opinion that he has weakened a very strong case by stating it rather too strongly. We know his object in doing so was to provoke discussion. That object has now been attained, and therefore I think we should endeavour to reconcile the two views and try to arrive at a practical conclusion, which will be approved of by both sides, and not create the impression among the less informed public that there is any radical difference of opinion between the two classes of experts. To assist in arriving at that desirable practical conclusion may I offer the following suggestion? It is too often the case that those who speak on this subject talk of the Navy alone as the first line of defence, and of land fortifications as belonging to a second line of defence, whereas military harbours, dockyards, and coaling stations are as much parts of the first line of defence as are the ships themselves. Indeed they are quite as necessary a part of the Navy, as in a previous generation were the sails and cordage required for the fleet. Therefore, if we treat these fortifications, which are absolutely necessary for the Navy, as part of the first line of defence, many of the difficulties which stand in the way of reconciliation might be removed, and there will not, perhaps, be the same differences of opinion. Whatever fortifications can *not* be

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treated in this sense, as a part of the first line of defence, might be, or should be, in the meantime neglected, and those which can be thus treated should be completed and receive expenditure and attention, in direct proportion to their importance as a part of this first line—no more and no less. I do not maintain that all coast fortifications belong to the first line of defence, but there are some positions indicated by naval authority—where a light armament sufficient to repel single cruisers would relieve the Navy materially, and economically, from a duty which falls on it, so far as they do so—might surely be included. I trust some conclusion may be arrived at which will stimulate the authorities to expend at once what is required to complete the first line of defence, and to treat the whole of this as one subject. I perhaps might be allowed to refer to another part of the lecturer's paper which referred to the manner in which the coast fortifications are now carried out. All the types of coast works in existence he divided into three different classes or types, and he mentions as a fact—to this I beg to draw your particular attention—that these defences are now carried out exclusively on the third type. Major Walker mentions that every emplacement now being built throughout the Empire is of this type, which he states is now most in favour. This system or type he informs us “is to take full advantage of the power of modern artillery, in order to disperse the guns both on plan and elevation without losing the power of mutual support, and also to give them the greatest possible amount of concealment by the use of disappearing mountings, and by the assimilation in appearance of the batteries to the surrounding ground.” I should like to quote from a paper read by me in this theatre nineteen years ago all but a month, viz., on the 14th April, 1870, in which I recommended the disappearing system for coast works in the following words: “The guns should be scattered so as not to draw converging fire from the ships but to be able to converge their fire on them; all natural advantages should be seized as a means of disguising or masking the exact position of the guns. The guns should be so arranged as that each should have as great an opportunity as possible of using the new powers of traversing conferred by the system, either in attacking ships or in covering the ground in front of other guns. Batteries should be generally well retired from the Channel so as not to be readily approached from ships, and so that the increased precision of land fire would tell to their advantage,” and so on. You will observe that the ideas are exactly, and the words almost, the same. In other words, the system now being alone applied is what was formerly known as the Moncrieff system, which was recommended and explained in this theatre nineteen years ago, and officially and otherwise on many occasions both before and since that date. I may also add that I have spent twenty years in pressing forward that system, and what is more important, in providing the means for making it possible. I naturally feel very much gratified indeed to find that the labour of the best part of my life and the persistent advocacy of twenty-five years has resulted in the system which I have so long recommended being the one which is now alone supplied throughout the Empire for coast fortifications, as stated in the lecture, and to see it so universally adopted, and I am proud of having so far benefited my country. It is a much greater change in principle than it seems. Until it was adopted and superseded the two other methods, which change may be said to have commenced about five years ago, through the influence of the late Inspector-General of Fortifications, the system was known by my name. Now that it holds the field, that name is never officially used. While feeling gratified that the disappearing, or more properly the invisible system, is being applied to so many works, I confess candidly that I do not enjoy what you may have also noticed, its simultaneous and complete application to that system's author.

Professor LAUGHTON: There can, I think, be no question that, as Sir Vesey Hamilton has pointed out, the function of fortified ports has been in all ages the shelter of the fleets of the weaker Power; when a nation is strong at sea, forts are useless—of what use, for instance, have our forts ever been? Have the fortifications of Portsmouth or Plymouth for the last 200 or 300 years ever fired a gun in anger? Have they, by their mere existence, ever deterred an otherwise possible attack? From time to time considerable sums have been spent upon them, but they have never been of the slightest use. In 1779, when the most formidable demonstration of the enemy was made in the Channel, the fortifications of Plymouth

were crumbling to ruin, the guns were honeycombed, and the garrison consisted of something like fifty men. The combined fleet of sixty-six sail of the line was off that port, and a large army was gathered on the coast of France waiting to be brought over; but no attack was attempted. D'Orvilliers and Cordova would not venture on any such attack. Why? Because Sir Charles Hardy, with a fleet very much inferior to theirs, amounting in fact to little more than one half, was off the Isle of Wight. That fleet was the defence of Plymouth, not the crumbling fortifications. It seems to me that many Officers, both military and naval, lose sight of the extraordinary power of a fleet in territorial attack. I am not, of course, speaking of the ordinarily understood duties of a fleet for blockade or naval engagement, but as commanding the shore. Now this may be to some extent matter of opinion, but I base my idea on the opinion of experts of the very highest authority. You will, I hope, excuse me if I read one or two of them. The first I shall quote is Nelson, not as to what he did but as to what he said might have been done. He wrote to Lord Keith after the fall of Genoa in 1800: "I say that the British Fleet could have prevented the invasion of Italy (in 1795), and at that time we had nothing to do; and if our friend Hotham had kept his fleet on that coast I assert, and you will agree with me, no army from France could have been furnished with stores or provisions; even the men could not have marched." The fleet, in fact, would have commanded the road all along the coast. Another man who, in some respects, in what we may call partizan war, was Nelson's equal, Lord Cochrane, wrote in his mature age, referring to what he had done in his youth, that he would stake his professional reputation on the assertion that "neither the Peninsular War nor its enormous cost to the nation would ever have been heard of" if he, Cochrane, had had the command of a small frigate squadron in the Bay of Biscay; that it will always be easy "so to harass the French coast as to render any operations in Western Spain or even in foreign countries next to impossible." These seem to me exceedingly strong opinions, though not referring to operations against our own shores: but if it is easy to prevent the enemy from invading other shores, *à fortiori* it must be to prevent them from attacking our own. With reference to these I had noted that remarkable passage from Raleigh's "History of the World," which Sir Vesey Hamilton has already read. But I may trace the same idea at a later period. In 1785 a Commission was appointed to inquire into the proper way of defending the dockyards. This Commission had at its head the Duke of Richmond, the Master-General of Ordnance, and with him were associated seven Officers of the land service and five of the sea service. It would seem from this preponderance given to the land service, that the question was considered from the first as one mainly affecting it. The data put before the Commission assumed that the fleet was away from England for three months, and that preparation was to be made to resist an army of 30,000 men landing from France. The advisability of fortifying the dockyards was formally stated and agreed to; but some of the naval Officers, and especially Captain MacBride, afterwards declared that the Duke of Richmond had acted throughout rather as the guide than as the President of the Commission. That perhaps might be disputed, but it is beyond dispute that the naval Officers on the Commission, including Milbanke, Graves, Jervis, and (though not so formally) Barrington, drew up, not exactly a protest, but an explanatory memorandum which ran in these words: "That our proceedings have been founded on the supposition of the whole fleet being absent for three months, as mentioned in the second datum, and, therefore, that the enemy may bring over an army of 30,000 men with artillery proportionate to an attack on Portsmouth or Plymouth, having three months to act in uninterrupted by the fleet. The bare possibility of such an event we do not pretend to deny, but how far it is probable that the whole British Fleet may be sent on any service requiring so long an absence, at a time when the enemy is prepared to invade this country, we must humbly leave to Your Majesty's superior wisdom, and therefore, whether it is necessary, in consequence of such a supposition, to erect works of so expensive a nature as those proposed, and which require such large garrisons to defend them." That is the opinion of men with the memory of 1779 still fresh in their minds; men too who were familiar with the events of 1759. Our ancestors used to speak of the Navy as the "wall and fence of the Kingdom." In modern times people have got to speak of it as the "first line of

defence." I object *in toto* to the expression. I do not know whether anyone ever heard a German speak of their army as their first line of defence, or of their Navy as the second line. They have a navy, and one of which they begin to be justly proud; but to speak of it as for the defence of the country, to be compared with their army, I cannot suppose it ever entered into a German's head. Now, I venture to think that the phrase of our ancestors was a correct one; but even if we are to adopt the new-fangled phrase, if we are to consider the Navy as merely the first line of our defence, surely it is on the first line that our principal expenditure should be made. Without now going into the detail of the Estimates, I am under the impression that the ratio of expenditure on the two (so-called) lines of defence is exactly the opposite; and that year after year the expenditure on the "second line of defence" exceeds that on "the first" by several millions. Major Walker, in his paper, seems to consider that he scores a point by saying, that even with the additional $12\frac{1}{2}$ millions proposed to be expended on the Navy in the next four years, it will still be very far short of the ideal described by Sir Geoffrey Hornby, Sir John Hay, and others; but even with that fourth part of $12\frac{1}{2}$ millions added to our naval expenditure, the annual sum spent on this "first line of defence" will fall far short of that annually voted for the "second"; and I venture to say that if for the last twenty years the 5 or 6 millions by which the Army Estimates annually exceed those of the Navy had been spent on the Navy and on what we are daily told is our "first line of defence," we should have come very near indeed to attaining even the ideal which we are now told is utterly Utopian. Before sitting down I should like to say one word, almost a personal one, as to the relief of Gibraltar. Major Walker says: "After all the fortifications did defend Gibraltar, the country wanted Gibraltar defended and it was defended." I maintain, on the contrary, that the fortifications did not defend Gibraltar, that if we had not been able to resume the command of the sea, fortifications or no fortifications, Gibraltar would have fallen in the spring of 1780, or in the summer of 1781, just as certainly as Minorca fell in 1782. It was to the enormous price which we paid for its relief by Darby in 1781 that I called attention. I am not for one moment saying that the country did not wish the place to be defended: quite the contrary, in the eyes of the country the defence was all-important; and it was and is justly proud of that defence. What I wished to emphasize was the enormous price which we paid for its relief. That price was the surrender of Cornwallis and the loss of our American Colonies. Putting sentiment on one side, I am not prepared to say that Gibraltar was worth the price. I do not think it was. I am not able to find in history any instance of Gibraltar having been of commensurate value to us; and I am quite sure that, if we were at war, and Gibraltar, in the hands of the Spaniards or the French, proved a thorn in our side, it would be no very difficult matter to take it from them, provided only that we had continued command of the sea.

Captain HUBERT GRENFELL, R.N.: In the few remarks I have to offer I do not wish to speak as a sailor, but as one of the public. I wish to note that if the papers which have been read, and if the discussions which have taken place mean anything, they mean this, that the highest experts in the Army and Navy of Great Britain are in sharp conflict upon the very foundation and essence of the question on which our existence as an Empire depends. It comes to this, that here in the greatest Empire in the world, as we like to call it, with a matériel and personnel whose excellence we are never tired of vaunting, we are still without what, for general purposes of explanation, may be called a "Plan of Campaign." Now, there are a great many Officers, I have no doubt, in this theatre, who are well familiar with a body called the German General Staff. I have some knowledge of it, and I would ask, what would be the answer which would proceed from the German General Staff if such papers and such discussions were mooted there as have been mooted here? I would ask whether the suggestion—and these papers and discussions are such a suggestion—that the principles on which the defence of the Empire rests are still unsettled and uncertain, would not be received with contempt and derision? Would they not say, "What on earth are we here for? Do you think that we are such bunglers at our trade that the very essence and foundation of our craft has not been thought out, and that we have absolutely no foundation upon which to proceed to build?" I do not wish to disparage our Intelligence Departments.

They have done most excellent work for the country, but I maintain that their work requires to be supplemented by some body analogous to the German General Staff. We need not, perhaps, go further than this theatre to find plenty of talent to deal with this question, but, at all events, I maintain that in the country there are adequate means of absolutely settling this question of how our Empire should be rendered secure, and if this is once determined, it would render such discussions as we have heard this afternoon, valuable as they are, absolutely unnecessary.

Captain GERARD NOEL, R.N. : I have read this paper with great interest (as I was not able to attend when it was read). I am very much impressed with the skill with which the battle with Admiral Colomb has been fought out, but I think in Admiral Colomb's answer he again gets the weather-gauge. I agree with the lecturer thus far, that naval ports and coaling stations should be defended by fortifications of sufficient power to enable them to cause considerable delay to an enemy who has temporarily overwhelmed the naval forces in the neighbouring waters, and that the mercantile ports should be sufficiently protected to warn off raiders. Major Walker's demands, I think, will be generally considered as moderate, but many naval Officers do not consider them sufficiently moderate. Now, I am of opinion that it would require a very limited amount of protection to warn off raiding cruisers, and that very moderate fortifications would afford considerable protection to our naval ports and coaling stations. For there can be no question of this, that it is a wrong policy for ships to submit to be mauled by forts; every shot that takes effect in an enemy's ship from a fort is so much clear gain to our Navy. Supposing, for argument's sake, that the enemy did, after a successful engagement, obtain command of the Channel temporarily, it could not be considered his policy to attack even a very moderately defended Portsmouth or Plymouth; he knows better, he must maintain his fleet intact in order to meet our refitted fleets when they are ready for sea again. Now, on the question of the command of the sea, which apparently is understood in such very different senses, I should like just to point out what may be considered a very good example of such a command. During the recent Russo-Turkish War in 1877-78, the Turks had a slightly more powerful fleet than the Russians, and what was the consequence? The Russians were locked into their ports in the Black Sea; they could make no use of the sea for moving troops or supplies, and the result of that was, as I do not doubt, the campaign was double the length, and more than double the cost, it would have been otherwise. If they could have carried their troops and stores from Sebastopol or Odessa along the coast, they would have brought the campaign to an end much sooner, and the reason they could not do so was simply because the Turks had a slightly superior naval force. In conclusion, I would just say a word on what one would conceive to be the duties of the two Services; the Navy holds that it is its primary duty to secure England from any approach of the enemy, and it expects every available person in the country to join forces in preventing an invasion, if such a dire event should seriously threaten. Of course, we look to the military to organize such a force, but as long as the Navy is on a proper footing the question of invasion is not to be entertained. The particular province of our sister Service, under these circumstances, is to join forces with us (that is with the Navy), and to carry the war into the enemy's country.

Sir JOHN COLOMB, M.P. : I did not intend, Sir, to offer any observations to this meeting on this discussion, had it not been for the observation of our friend Sir L. Nicholson, who raised the real issue involved, I think, in this discussion. He did so in the clearest possible words when he said that fortification was a substitution for what he called a third fleet—that fortifications were in substitution of naval sufficiency, because that is what it comes to. Now that is an assertion with which I must say I absolutely differ. I say, and I should challenge anybody to give proof that my view is not correct, that no fixed fortifications can take the place of mobile fleets. I was very glad Professor Laughton alluded to the misuse of a term describing the Navy as "a first line of defence." It strikes me that very term has led us into much of that confusion which we are to-day discussing. When we talk about a "first line of defence," I think we can only mean that it is a first line of defence against invasion. I can in no other way understand the adaptability of that term unless it be that it is the first line of defence against invasion. But, Sir,

I think that arises from not taking what is necessary in the question, an all-round view. You cannot say that the Navy is the first line of defence for the Empire, for this reason, that it is the only possible line of defence of the internal communications of the Empire. You cannot say that a Navy is the first line of defence for the protection of your commerce, because it is the first, second, third, and only line of defence for the protection of your commerce. Therefore it comes to my mind to this, that if you mean to preserve your Empire, as the internal communications of your Empire are sea communications, you cannot argue down the limits of your necessary naval force by bringing in fortifications at all. You have to provide for the sufficient protection of the internal roads of the Empire, and they are sea roads. Now even granting, which I cannot, for the sake of argument, that this country could survive the loss of her Empire, she could not survive the loss of her commerce. To say, "We will only think of the country, and not of the Empire, and we will whittle down our naval force to the extent necessary only to defend the country," leaves you still face to face with the fact that the commerce of the country is over the sea, and all over the world, and without that commerce the country cannot live. Hence you cannot whittle down the naval force necessary for the protection of your commerce. Then it comes to this: how is that force to be applied, and how is its extent and nature to be estimated? Well, it is estimated by the necessities involved, by the consideration of the ports of issue of an enemy, and the forces to issue at his disposal. You cannot protect your commerce unless you are prepared to play the part of a cat that does not run about the house looking for mice, but places itself down at the mice holes. In that sense I say the protection of the commerce of the country forces you to have a sufficient fleet to dominate the force of the enemy off its ports and in its own waters, and when you have done that—and now I come to the real point—would any territorial attack upon the country be possible? My gallant friend Sir L. Nicholson says, "Do not look at one or two Powers, look at three or four"—that is the question. The question is the possible combination, and you must be prepared, I say, to meet possible combinations, whether of one, two, three, or four. That being so, for the protection of your commerce you are bound, for the safety of the people of this kingdom you are compelled, by reason of their dependence upon trade, to have a sufficient fleet to keep the bulk of the enemy's fleet practically in its ports, or to ensure that you shall beat him when he comes out. It is from that point of view I approach this question, and it is only when you are assuming that position that you are entitled to consider fortifications at all. Therefore, when you are in a position to defend the roads of your Empire, when you are in a position navally to do what is necessary for the protection of your commerce, you have destroyed the possibility of a combined naval force acting and co-operating in your own waters, and you have taken the first step for the security, not only of your Empire and your commerce, but of the shores of this kingdom. Therefore, I ask, "Are we justified in accepting the lecturer's views?" I say we are not, because the lecturer's views are founded on the supposition that fortifications can take the place of a fleet, as stated by our friend Sir Lothian Nicholson.

Sir L. NICHOLSON: No, no.

Sir J. COLOMB: Well, I am sorry indeed if I have misunderstood him, but I will ask him did he not say that fortifications were in substitution of what he called a third fleet?

Sir L. NICHOLSON: Yes.

Sir J. COLOMB: That is my point, but I do not accept his division of the Fleet into one, two, or three. My contention is that it is a whole fleet, a sufficient naval force.

Sir L. NICHOLSON: You must not take one part of my argument without taking the whole.

Sir J. COLOMB: I am very sorry that I misunderstood my gallant friend. I challenge him now to say, did he not, perhaps by accident, assert that the fortifications were in substitution of what he called a third fleet?

Sir L. NICHOLSON: Yes.

Sir J. COLOMB: The division of the fleet into one, two, or three parts is an arbitrary and artificial division, and it does not really affect the question. The question

is the sufficiency of naval forces for the definite purpose of protecting your commerce. That is my point of view, and a part of that force he designates as the third fleet. Therefore he accepts naval insufficiency, because he says fortification will take the place of the third fleet.

Sir L. NICHOLSON: No, no.

Sir J. COLOMB: I cannot understand the position from any other point of view. That being so, we must now come to the question of fortifications, and I say distinctly that I have always held that you must protect the stores and the depôts of your fleet. That is what I maintained twenty-five years ago, and I stick to what I then thought, because time has certainly confirmed my opinion. You must have by local means protection for the stores and depôts and supplies of your fleet. Therefore it comes to this, when you have provided for the protection of your commerce by dominating the naval power of the combination of your enemies in their waters, what then are the attacks that you may expect upon the supplies and stores of your own fleet? I say everything goes to show that the only attack that you would then have to fear would be the attack of raiders. That is what I have always maintained, and I do not understand my brother ever to have said that he would leave all the ports and stores and coals of the Navy absolutely without local protection from what may be reasonably anticipated as raiding attacks. Therefore we come to consider the extent to which the improvised cruisers, or possibly war frigates, may escape under the circumstances I have named. The next point is, is it likely that they will attack these places? All I ask is—and I think I may claim to have raised this question of local protection twenty-five years ago—reasonable protection by local means for our naval stores and coals all over the world against raiding attacks. What I complain of is this, that we should have extended that view until we have got to this horrible doctrine, that you can supplement naval power by fixing fortifications with militia or volunteers behind them. I have spoken rather warmly, because I feel so. I do exceedingly feel the gravity of our position as an Empire. I agree with my friend Colonel Brackenbury as to the differences arising on vital points between different naval and military authorities. I am quite sure the naval and military authorities have only one aim, and that is to get at the truth, and do the best for the nation. What I think has been the fact is that military and naval authorities have been led astray from a calm consideration of material facts by politicians and by popular influence based upon erroneous information. I am anxious to say also, that if the country will not provide money enough to discharge the naval and military obligations of this Empire, we have to consider the relative value of the different necessities of our defence, and that if we have only a certain sum to spend, and that sum is not sufficient to do all that naval and military men agree is necessary, you must sacrifice your fortifications, and even your army, to your fleet. I hope that will not be necessary. Before I sit down I would say another thing. Sir L. Nicholson said these garrisons and fortifications were to release the Army. Well, Sir, I cannot see, if you exaggerate the proportion of your fortifications at Portsmouth, Chatham, Plymouth, and Pembroke, and elsewhere, and at your mercantile ports, I cannot see how you are releasing the Army. I, Sir, look at the field of operations of the Army, not in this kingdom, but over sea, and on the frontiers of the Empire. When we remember that we have military or land frontiers abroad, which put together are equal in extent to the distance from this to Cape Horn, I feel it is time to think whether we are right in localizing the bulk of our military forces in its area of action to the United Kingdom only, as we have done. What I feel strongly is, that for the protection of the internal roads of your Empire, you must have a sufficient navy. India, every Colony, and every dependency under the Crown has a direct and common interest in the sea, and you can expect that the Colonies and possessions will act by and bye, as Australia has begun to do, and that they will help you to create and maintain this sufficient fleet. Therefore I decline to discuss a policy which has at the bottom of it the locking up of money and military force in an undue proportion, and an overdone system of fortifications for the protection of this country by purely military force from invasion. If we are going into the future with any confidence at all, we must go into it with a policy that, come what may, let nations develop their fleets as they may, the British Empire must do it also, or the British Empire dies; and having done that

we come to the next step, that is, a sufficient Army adapted for the defence of India and the Colonies abroad, and above all things adapted for counter-attack by descents under cover of our fleets on the shores of the enemy. Then you may face the future with confidence; but I protest against the doctrine that you are to go forth into the future with an insufficient fleet, and merely some newly arranged fortifications exaggerated in their proportions, and unnecessary in their extent for the protection of this country.

General Sir LINTORN SIMMONS, G.C.B., R.E. : The points which have been discussed in these various meetings seem to me to have brought the naval and military contentions to a much closer agreement than existed when the paper was first read. That paper I must say I misunderstood, in much the same sense as Colonel Brackenbury did, that it was intended, or at any rate if it was not intended, that it carried with it the contention that all military defences on our coasts, and for our naval and commercial ports, were unnecessary, and that their entire defence ought to be left to the Navy. The other day when I spoke here I said, and I repeat it, that if our Navy were so strong as to be able absolutely to guarantee what Sir John Colomb has rightly called the interior communications of the Empire, fortifications as a matter of theory might become unnecessary. But I asked the question, and have heard no answer, "What will be the extent of the Navy that would be required to afford absolute protection to those communications in all parts of the world?" I took the Report of Sir R. Vesey Hamilton, and the other members of the Committee who reported on the manœuvres in detail; there were five requisites mentioned as necessary in order, according to their views, to place the Navy in a proper condition to oppose a great maritime Power. What were those five requisites? I believe that they would, if properly worked out under the supposition that we are opposed to two or three maritime Powers, increase the Navy to ten times what it is now proposed by the Government. (No, no.) Yes, I repeat it. Work the problem out in detail. We have the statement of these gentlemen that for a blockading fleet you require five ships in the blockading squadron to three ships that are blockaded. You then require an effective reserve squadron, absolutely confined to home waters, sufficient to hold the Channel and protect the coast and commerce of the United Kingdom. Then, in addition, they say you require ironclad ships for active local defence on the coasts for the protection of Great Britain, Ireland, and the Channel Islands. (No, no.) All I can say is, there is the Report, which you can read. I have not got it with me now, but I had it at the previous meeting, and quoted it *verbatim*. Altogether they have demanded a very large order, such an order that I believe that the country would not dream of it for a moment, and I doubt very much whether you would find sailors sufficient to man the fleets if they existed, and to carry on the commerce of the country at the same time. I hear naval Officers assume that they have the command of the sea. I do not believe our British Navy at the present time is in a position to warrant that assumption: I believe it is not in a position to enable us to take that as an axiom, and it certainly is not likely to be so before the year 1894, when the Admiralty programme, which is a very great step in advance, has been completed. I believe that programme is a mere instalment of what we require, and that before we can assume as an axiom that the British Navy commands the sea, not only in our home waters round these islands, but in the Chinese seas, in the Australian seas, in the Mediterranean, and elsewhere, the naval defence will be a very expensive operation. That being the case, I think what these gentlemen are all agreed to is self-evident, that the "stores and other things" must be protected by other means, and that the real question under discussion is as to the amount of protection to be afforded in each case. We are agreed on that point now: the question then is what is to be the nature of that defence. Now I can state most positively, having been on Lord Carnarvon's Commission, and having been employed in various ways in connection with fortifications, that the fortifications that have been constructed for many years are not excessive. The amount laid out on actual fortifications in the Annual Estimates is only a few thousands, 10,000*l.* or 20,000*l.* at the very outside, and that has been the case for the last fifteen or twenty years. There was a loan of 3,000,000*l.* the other day, but that was not so much a question of fortifications, as it was due to the improvement in matériel, which rendered necessary the changes in the armaments, and the

re-arming of the fortresses. But there is a fallacy which, I think, underlies a good deal of what has been urged. It was referred to by a previous speaker, and it is also referred to by Admiral Colomb, who says: "Are we sure that it is not mistaken ideas on the question of defence which produce the anomaly of the greatest Navy in the world costing only 14,000,000*l.* a year, while a numerically small Army costs 20,000,000*l.*?" The question so stated has nothing to do with the defence of England. A great portion of the Army that costs 20,000,000*l.* is connected with the defence of our land frontiers in India and elsewhere, except that India pays for the Army actually in India; but it does not pay for the Army in England, which is the depôt in great measure for the large force in India. The same thing applies to the defence of the frontiers of the Cape of Good Hope: a large force is almost constantly required there, or there must always be a military force ready to be sent there. These are all included in that estimate of 20,000,000*l.*, so that it is a comparatively small portion of that 20,000,000*l.* which should be taken into account in considering this question of the defence of our maritime ports. Then we hear what the duty of the Army is: it is said one great duty is to go abroad and fight on the Continent. For my part I believe the day is gone, at any rate until the great armies of the Continent are reduced, when the small active Army of Great Britain available for such an enterprise, which at the outside will amount to 50,000 men, will be of any great effect in Continental wars, unless under one contingency, namely, when the military Powers have exhausted themselves in the contest; then such a small contingent as that which England may send on the Continent might be of some importance in determining the war. But as to the idea of sending troops abroad and launching them on a great expedition on the Continent, I think it is out of the question. What we can do is this: when the defence of our ports is of importance, and the defence of some of them is undoubtedly of the greatest importance, should an enemy's squadrons or raiders attempt to attack them; say, for instance, London. If London were totally devoid of fortifications; if the Thames were open, there would be nothing to prevent ships coming up and destroying an enormous amount of property now in comparative security behind the defences which exist in front of Gravesend; whereas these defences would prevent such a disaster. They are also of the greatest importance from another point of view, that is, if they exist they will most probably not be attacked. It is no argument against permanent defences to say, as has been urged in these discussions, that the fortifications of Plymouth or Portsmouth have never fired a gun in anger, but the fact of their being there has prevented them from being attacked. I am not an advocate, nor do I think any military man is an advocate, for excessive fortifications; on the contrary, we desire to minimize them to the utmost, consistent with what may be the probable attack that may be made against them. I was very much struck by what Captain Grenfell said, and I quite agree with him that this discussion is very difficult to carry on here, because there are numerous points in the consideration of these questions which cannot be divulged in public. We are therefore in a very imperfect position for the discussion of these great questions in this theatre. It would be as absurd for the Government, or for authorized people in this country, to expose our weak points, or to develop the measures necessary for the defence of the Empire, as it would be for the German Staff to exhibit all their plans of offence and defence across their various frontiers. For this reason I think the discussion, although it has produced good, cannot come to any final conclusion. I only regret, and what has been said by one speaker has supported my view, that we have two departments, and that there can be any possibility of division of opinion between the two Departments. I think, as I said before, we ought to have a great Department of War, which should consider the whole question, with subordinate Departments of the Army and the Navy working under one responsible head. And I am further tempted to say, that if there were a calamity or disaster to this country there is no single person that could be held to be in the least degree responsible for it. The Government of the day may be turned out, but that will not afford a remedy. We have changeable Governments: there is no one responsible, and it is an utter myth for the country to suppose that anyone, even a Secretary of State for War, or a First Lord of the Admiralty, is responsible for the defence of the Empire. I think the only way to settle the question is to have one

great Department of War, as they have in Germany. There the head of the Department is the Emperor, who brings together all the various opinions of the different Services. I think we ought to have a similar Department under a responsible Minister for War, assisted by persons of experience, who would not be subject to frequent change, and would be responsible before the country for any advice they might give, and if things were to go wrong through their neglect, they ought to be hanged.

Major WALKER: I should like to make my observations very short, but the advantage which Admiral Colomb has had of answering at very great length in print the observations which I made the other day will necessitate my taking up a few points, though I will endeavour to make my remarks as short as possible. The reason that I am obliged to make some reply is that Admiral Colomb has made charges against me which directly call for an answer. He has given one or two instances to prove that I made "wild shots" in some of the illustrations I have given, and he implies that I have not thought at all about what I was saying as to the real bearing of these points upon the question under discussion. Well, Sir, that is not the case: if Admiral Colomb will excuse my saying so, I did not make wild shots: I may be wrong, but I thought and still think that the instances I brought forward bear out my statement as far as it goes. I think that where Admiral Colomb has misunderstood me is that he has thought that I carried my argument a great deal further than I intended to do. Of course my argument will not bear out the statement which I assume Admiral Colomb supposes I intended to make, that a flanking fleet is of no use whatever. I began my lecture by saying that I admitted that the principles of strategy are eternal. They are just as applicable to a naval force as to a military one, and for anybody, soldier or sailor, to say that a flanking fleet has no effect would be an absurdity. What I wanted to say was that it was not an absolute bar to any action in every, even the most extreme case. Admiral Colomb, I thought (I may be wrong), in his lecture asserted that the flanking fleet, no matter how small or how distant, was an absolute bar: and he quoted the case of the Baltic as a proof of that. With this explanation I will proceed to answer a few points in Admiral Colomb's reply, and first as to the money. He objects to my saying that the average Englishman does not like fortifications. He says, "the average Englishman voted 11,000,000*l.* for fortification in 1860, and 3,000,000*l.* in 1887." The average Englishman no doubt anticipated an expenditure of 11,000,000*l.* in 1860, but there was not any such expenditure; there was an expenditure of less than 7½ millions. Again, the 3,000,000*l.* now voted is not 3,000,000*l.*, but only 2,600,000*l.*, and of that a very considerable portion is not for fortification proper, so that you must make a considerable deduction from Admiral Colomb's 14,000,000*l.* There is another point which, I think, is still stronger, and that is, what are these millions for? To say that from 1860 to 1880 we spent 7½ millions on fortifications is an absurdity; why was it necessary to spend 7½ millions in 1860? Because the fortifications of the country had been neglected since 1815, so that the 14,000,000*l.*, with the deductions I have mentioned, is the expenditure on fortifications for seventy-five years. Now we come to the small point about the twelve guns in cupolas. The fact is, if it is a mistake it is a "Times" mistake, which I do not think is worth noticing. Again I say "naval history says no." Admiral Colomb twits me with having confused battle-ships and cruisers, and he apparently thought that I imagined an attack by cruisers while he said battle-ships. I may have fallen into the error, but surely the less is contained in the greater, and I assume if you could have five battle-ships off Plymouth, you could have a few cruisers, and more than that, if you have five battle-ships, I have always understood that a fleet of battle-ships would be accompanied by cruisers. I believe that is the proper formation of a fleet, to have vessels of all sorts combined, and if there were five battle-ships they would have a proportion of cruisers with them. However the question is hardly worth disputing about. Then he asked me very pointedly what Plymouth was fortified against. I think I ought to say that I was discussing Plymouth as unfortified. I was talking of Admiral Colomb's assumed Plymouth where he said: "Supposing there had been no fortifications at Plymouth there still would have been no danger of attack at all." But as a matter of fact Plymouth is fortified against a powerful attack, not only an attack

by cruisers ; and with reference to this Admiral Colomb may say, not to me but to the authorities, "That is your military ignorance in having fortified Plymouth against attack by a fleet which is impossible." But is that the general opinion of the Navy ? It may be wrong. But there is a remarkable case to indicate at all events a divergence of naval opinion on the point. A very short time ago at Shoeburyness, before the School of Gunnery, a naval Officer, Captain Meryon, who of course we presume is an authority on naval affairs, lectured on this very subject. The lecture was based altogether upon the assumption that Plymouth was easily attackable by an ironclad squadron. Captain Meryon assumes that attacks on Plymouth, on Malta, and on Portsmouth were all possible, all easy, would all be carried out in a few hours ; there was no question of delay, no question of special ships.

Captain CUSTANCE : Might I explain, as I have talked with Captain Meryon on the subject, that it was part of his brief, he could not have lectured unless he had supposed that the place was open to attack ; it was part of his brief.

Major WALKER : I went down very shortly afterwards to Shoeburyness to lecture upon the subject of fortification. I assumed some facts, I said this, that, and the other about ships. I do not know whether what I said was right, but I assumed that an attack on a place like Portsmouth was not an easy thing for a fleet. Then they said to me, "Why there was a naval Officer down here the other day, and he told us how the thing is to be done. In Heaven's name how are we to get at the truth ?" I do not know exactly what the Navy want in the way of forts, now, even after hearing Admiral Colomb. Then there is the remarkable case of Ascension. The Island of Ascension belongs to the Admiralty, and what have they done there ? They have fortified it and mounted guns upon the island, and are now, I hear, particularly anxious to get modern guns for this station. Why this anxiety to retain and rehabilitate a station condemned by Lord Carnarvon's Commission if the Navy want no land defences ? The next point is the one about the Baltic, and this is very curious, because Admiral Colomb in fact says that I am utterly wrong, not having had the advantage of seeing the French authority from which he took his information, a pamphlet by M. Pont-Jest. My account of the Baltic campaign was taken from the only source I had at my command, the German official account. That I believe is perfectly accurate, and I am confirmed in that by this book which Admiral Colomb has now very kindly put into my hand, and which is the source upon which he depends for his argument. It is a description of the campaign given by a gentleman. I do not know who he is, but he says he was officially attached to the Admiral, so that I suppose he was an official of some kind, but he is not apparently a naval Officer. But what is it ? It consists of eight articles extracted from a French provincial paper, being a defence of the Admiral.

Admiral COLOMB : Not a provincial paper, but the seat of Government was then at Tours ; the *Moniteur* was published there.

Major WALKER : It is an extract from the *Moniteur* containing a defence of the Admiral against accusations which had been made against him, of having done nothing in the Baltic. When we come to the defence of an Officer for not having done something that he said he could not do, and that people thought he ought to have done in a campaign, written by a man under his orders, I think we might make some allowances for lapses from judicial accuracy, but I do not propose to make any. I accept the statements here, and what do they amount to ? From my point of view I think not at all to what Admiral Colomb wants. Admiral Colomb says, describing Count Bouët's having obtained information on the 13th August that the blockade was raised and the fleet at Wilhelmshaven was coming to the Baltic, Bouët ordered the fleet to reassemble at the Great Belt to meet them, and that it is conclusive of the power of the flanking fleet. Bouët had six or seven ships. There were at Wilhelmshaven three frigates. I believe there was another German ship at Kiel, a wooden frigate, and these ships were coming round, so Admiral Bouët orders his fleet to go and meet them at the Great Belt. What else could he have done ? (Admiral Colomb : Hear, hear.) Here are three ships. (Admiral Colomb : It is a fine point.) Oh ! no, it is not, if you will only hear me. Here are six ships with the opportunity of eating up three ships,

and they take the opportunity. The Germans did not come round, unfortunately, and Bouet did not eat them up. What does he do? When this opportunity is removed he goes right on to Colberg and prepares to bombard, but he does not do it. Why, because of the flanking fleet? No, but because, he says, upon the piers and wharves there was a crowd of women, children, bathers, old men and sick people, and he will not bombard them. Why? Because he wants to give M. de Bismarck a lesson in humanity and true courage. He gave him that lesson, but mark the sequel. A very few days afterwards he was joined by a ship called the "Rochambeau," which had a lighter draft of water than any of the ships he had on the first occasion, and it was able to get nearer up to bombard Colberg. He went back with the "Rochambeau" to bombard Colberg, and he lets out very innocently what he thought. This gentleman says in the pamphlet, if he had had the "Rochambeau" on the first occasion, it would have gone very hard with him if he had not had a shot—if he had not made what he called a "serious demonstration" against Colberg. Surely all this does not prove anything except that this Admiral, having had the opportunity to destroy a very inferior fleet, lost it, which does not prove, with regard to the three ships at Wilhelmshaven, that if he had known they were staying there, he would have taken the slightest notice of them. The ships were blockaded the whole time to the end of September, and he had the command of the Baltic, and he did nothing, and he tells us why he did nothing. He says he suffered from conflicting orders, from shallowness of water, and a lot of other causes, but he never once utters a syllable about the flanking fleet.

Admiral COLOMB: Would you mind quoting the last paragraph which is quoted in the print.

Major WALKER: "La machine tint bon, heureusement, et le 'Rochambeau' parvint à rallier l'escadre, quise dirigea sous Kioge-Baie. Colberg, une fois de plus, a été sauvé, car à peine au mouillage, le Vice-Amiral Bouët fut informé que l'escadre du nord était entrée à Cherbourg, que la Jade était débloquée, et très-probablement la flotte Prussienne en profiterait pour pénétrer dans la Baltique, afin de l'y surprendre."¹ Now, I take the case of the Mediterranean. That is also rather curious. Admiral Colomb again made some assertions that were very strong as to my ignorance of the subject and the fact that Napoleon knew nothing at all about the possibility of interruption. Now, on that point, there are some curious details that I have noticed. Napoleon arrived at Toulon on the 8th May. The same day Nelson entered the Mediterranean at Gibraltar, and Admiral Colomb is correct when he says, before Nelson entered the Mediterranean there were no British ships there. But Napoleon was fully impressed so early as the 8th May with the necessity for haste. "He knew from the movements of the English that he had no time to lose."² Again, on the 19th, the day the French sailed from Toulon, Nelson was actually cruising very near Toulon. On that night his fleet was dispersed by a storm. The French fleet got to sea without Nelson having been aware of it, and the French proceeded to Malta, where they did not arrive till the 10th June, but as late as the 2nd June Nelson knew that the whole of the French transports had not sailed from Genoa, so that he not only knew that they had escaped, but also in a general way where they were, in fact he expected to meet them at Naples or Sicily. On the 7th June Nelson was joined by a reinforcement of ten ships of the line, which brought him up to an equality with the French fleet in line-of-battle ships. He sailed after the French and the result we all know. But there are a few other points that I would like to mention with regard to the knowledge of the French of the danger they ran. In the first place Lord St. Vincent was blockading Cadiz and had been there for months, and that was quite enough on the extreme theory of the flanking fleet. Lord St. Vincent had eighteen sail of the line at Cadiz, and on the extreme theory of the flanking fleet Napoleon ought not to have been able to stir out of Toulon even supposing that Nelson had never come into the Mediterranean. I am carrying it to the extreme point that I think Admiral Colomb did, and therefore I say that I was perfectly right in asserting as I did that Napoleon did risk it; he did know. He says himself distinctly in his memoirs that

¹ I read this in English.

² Bourrienne's "Life of Napoleon."

"the supposition of an engagement with the English was the general subject of conversation," *i.e.*, on board the French Fleet. And Bourrienne says with regard to the capture of Malta, how fortunate they (the French) were to obtain possession of this strong fortress, to have it handed over in two days to a fleet that "*was pursued by an enemy.*" Surely if anything is plain it is perfectly certain that they knew this danger. Indeed the French Admiral said, "God send we do not meet Nelson." Napoleon himself was so sure that they would have met the English fleet that he trained the soldiers to board an enemy's vessel. He had so strongly anticipated a contest with the English that he actually drilled the men in anticipation of it, so that I think there again I am justified in saying that Napoleon wilfully ran the risk. But now what do I mean by the whole thing? I felt bound to make this statement because Admiral Colomb accused me of making wild shots. On the contrary, I took a considerable amount of trouble. I have known the history of the expedition of Napoleon to Egypt since I was a child. What I am contending for is not that a flanking fleet is of no use, but that Admiral Colomb strained it too far; and all I say is this, that the flanking fleet must be sufficiently powerful, and must be within striking distance. And what does that striking distance mean? It is not a fixed distance; it is not 700 miles, 300 miles, or any other fixed distance, but it depends entirely on the genius, or the boldness, or otherwise, whichever way you like to call it, of the commander, and to some extent on the resisting power of the fortress. Napoleon risked it and he would have risked it over and over again; he risked it in Egypt; and what afterwards happened to him and his army does not affect the question in the least. Then there is the case of the Baltic. Admiral Colomb and Professor Laughton accused me of not knowing that the Russian ships were sailing ships, and that a portion of the allied fleet were steamers. I knew that perfectly well. Admiral Colomb says I did not casually read Earp's "Campaign in the Baltic." That was the very book I did read. I took the numbers of the combined fleet off Cronstadt, and neglected the detached squadron which made nine more ships under Admiral Corry (?), but that does not affect the point. Admiral Colomb proves my case for me, because he says that Sir Charles Napier was very much concerned about the safety of his flank. That is to say he was concerned about this Russian fleet, which (says Admiral Colomb) could not by any chance have issued out of Cronstadt; he was alarmed—I use the word in a Pickwickian sense—and still he went and attacked Bomarsund. What I say is this: if Admiral Napier, who was not perhaps a genius of the highest order, although a very distinguished Admiral, ran any risk that he thought was a risk, what would Napoleon have done under like circumstances? It all depends upon the man. Napoleon would have run the same risk if the flanking fleet had been within a quarter of the distance, and you may always have the same thing. You must remember, "Some new Napoleon may arise to fright the whole world again." I would like to see him, I think we want it. There is one very curious point. I will allude to it, because so much has been said to-day about the necessity for only light fortifications, and the difficulty of determining what the fortifications should be. Admiral Colomb says, "it is certain that it would take a great deal of fortification to stop a light attack," and he proves it by a very remarkable instance of the war in the Baltic, and it is absolutely true. But his whole argument is that I am putting too much value on fortifications, and here he is putting the very words into my mouth—here is the very proof that I want, that it takes a good deal of fortification to stop *even a light attack*. I quite agree that it does take a *good deal*, and it is merely a question of how much. Then, again, Admiral Colomb says that I did not know that Admiral Baird raised the blockade of Berehaven because some ships had escaped, and he feared, not an attack on his base, Milford Haven, but a superior force attacking Admiral Rowley's fleet; why did he not fear an attack on Milford Haven? Because it was fortified.

Admiral COLOMB: I shall not tell you why, but he did not.

Major WALKER: I should have begun by disclaiming any official sanction for my paper. I should add, that every opinion expressed in this paper is my own opinion, exclusively my own, and nobody else has anything whatever to do with it. There is next a question of refitting and revictualling about Kioge Bay. I think this witness of Admiral Colomb's, M. Pont-Jest, tells rather against him. He says,

Admiral Bouët-Willaumez in the Baltic had his open base at Kiøge Bay. And what does Admiral Bouët's apologist say, but that it was one of his great misfortunes, because he had constant trouble from it, that every time any ship had to revictual, he had to keep another ship on guard to prevent her being attacked; and another French Admiral actually left the North Sea and returned to Cherbourg, because he said he could not get any provisions or coals, because he had not a proper port to go to? In the second campaign in the North Sea the French had actually two squadrons blockading Wilhelmshaven, which returned alternately to Dunkirk to revictual. Admiral Colomb asked me where I got the illustration of the maritime frontier from. I am very sorry I cannot quote the passage, but I am almost sure it was in one of Brialmont's works. I read it when I was in Canada, and it made rather an impression upon my memory, but I cannot recall the exact reference. I have noted very briefly some of the things that have been said during the discussion to-day. It is quite impossible for me, to go into the whole story. With Admiral Sir Vesey Hamilton nobody could disagree. What he said was absolutely true, and I for one am certainly not concerned to deny anything he said. He asked some question as to whether I expected forts to do the duties of ships. The answer is, of course I do not. I said in my paper the comparison between forts and ships ought never to have been made; they are different things. He goes into my quotations about the attack on Egypt and Malta, and all that, but as he is not here, there is no use, I think, in answering him. I have already answered it in my reply to Admiral Colomb. Admiral Sir Edward Fanshawe made some remarks which I think I ought to answer. He spoke about my having proposed to have defence against a landing, but why did I do so? Why did I talk about a landing? Because if you reduce entirely the land force, then a landing becomes possible. If you are prepared, I do not think it is very probable. If you are not prepared, I think it is very possible and probable, and my reason for mentioning the subject is, because it was laid down a short time ago by Captain Penrose Fitzgerald, that he would disarm the volunteers. If the volunteers were disarmed, and we had no army in this country to resist an attack, the temptation would be so great, that some Napoleon would most undoubtedly try it. What did Sir William Harcourt say last night, a statesman of first class ministerial rank? He says: This craze for voting money for the fleet is all nonsense; it is a craze manufactured by the experts, and he adds, this is the point of it, I wish that the immunities which we enjoy in this country from invasion on account of the Channel—not of the Fleet, the Channel; it is the Channel, as I have said in the beginning of my lecture; hundreds of thousands of Englishmen are under the impression that it is the Channel that saves them, not the Fleet—he says, speaking of the immunity this extent of water gives us, I wish it would at the same time prevent us from attempting to go and attack our neighbours on the Continent. It shows the superstition there is, as I have said. Professor Laughton, I think, is the one exception to the icy atmosphere which has encompassed us. Professor Laughton appears to me to have got very hot over a subject that I think it very little worth contending for. Admiral Colomb has passed it by—my point, *i.e.*, about the relief of Gibraltar, as, I suppose, either unimportant or unanswerable. But Professor Laughton again to-day re-asserted very strongly all the old story about the fortifications of Gibraltar having caused us the loss of our American Colonies. What does it matter whether they did or not. What has that to do with the point we are discussing? The point we are discussing is whether fortification is a useful subsidiary to fleets, and in that particular case it was. It enabled Gibraltar to hold out in the intervals of the periods at which it was relieved by our fleet, and if it caused the loss of fifty Colonies, this has not the slightest bearing upon the question we are discussing. Professor Laughton brought forward another point very amusing, and it is so good I must ask your patience for a short time. It was with reference to the Commission of 1785, and Professor Laughton has correctly quoted all that was said and done by the land and sea Officers, but he has not told you anything about the debates in Parliament. Admiral Colomb sprung this large subject on me very suddenly, but I did get hold of some very curious speeches, from which I will read some extracts to you, as showing the real reason why that Bill was rejected. The proposal was for improving the permanent fortifications of Portsmouth and Plymouth, to enable the fleet to act with effect

abroad. The land and sea Officers reported unanimously that neither land nor sea forces are sufficient without fortification, and the first datum in the reference to the Board of Officers, to which the Board *unanimously agreed*, actually asserts the necessity for fortification of Portsmouth and Plymouth, by assuming "the temporary absence of the fleet, or its inability, from other causes, to defend the dock-yards." And Mr. Pitt asks, it having been asserted by somebody that the Board had been led by the nose by the Duke of Richmond, "Was it credible that a Board consisting of such men could have been duped into giving such a report?" The Officers who dissented did so on the ground, not that the fortresses were not required, but that there were no men to man them. Is not that very strange? "The land and sea Officers in the report agreed in adding gunboats as a defence in every case." There you see you have the Army completely agreeing with the Navy on the floating defence. There is no difference of opinion. Lastly they say: "Your Majesty's land and sea Officers humbly observe that they make this report in the full confidence that providing additional security to the dockyards is in no respect inconsistent with the necessary support of the Navy, which they consider as the first object of attention for the safety and prosperity of the kingdom." Is there the slightest difference between the opinion of the land and sea Officers in 1786 and the views put forward in my paper? You cannot show the slightest difference. Mr. Pitt said, in introducing the measure in the Commons, "*The system of fortification did always make part of the general defence of England*," and he would prove it by the most incontestable records of history," and he quoted in proof specific instances in every reign from Henry VIII to Anne. A gentleman named Bastard got up and said: "These strongholds will be seminaries for soldiers, universities for prætorian bands." Mr. Lemon said: "A system which might grow into a formidable engine of prerogatives." You see the point. It is nothing about the Navy; it is all (the old nonsense cropping up again) the fear of a standing army. Lord Hood, of whom Nelson said, "he was the best Officer, take him altogether, that England had to boast of;" and again, "that he was equally great in all circumstances in which an Admiral could be placed." Lord Hood strongly encouraged the proposal, and voted for it on the ground that it *would give freedom to the Navy*. But the great speech against the measure, the speech which carried Parliament against it, was made by whom? A great naval authority? No, by Sheridan, whom we all know only too well. And what was his argument? He said, this measure "strikes at the root of the Constitution itself." And, alluding to the proposed militia garrison, he says: "Would it even for a moment be pretended that men under such disciplined habits were not a thousand times more likely to despise the breath of Parliament, and to lend themselves to active purposes of tyranny and ambition, than the loose and unconnected bodies, which exist, even with jealousy, under the present regulations?" And again, it "must insure an unconditional submission to the most extravagant claims which despotism could dictate." That is to say, the whole argument against the extension of the fortification of Plymouth and Portsmouth was directed not against fortifications, but against the raising and maintaining of a military force for their defence. The House divided, and the resolution was rejected by the casting vote of the Speaker. If I had more time, and the meeting had not thinned out so much, I could have given many more proofs that the view I take is a reasonable one. But what is the view I take? I think it has been misapprehended. I do not propose for one moment to say that a powerful fleet is not our first necessity. I accept fully all that Sir Vesey Hamilton said; but I do think it is a pity that we should have brought this discussion at all into this arena. What do the papers say? The papers have taken the subject up very warmly, and I have seen a very large number of extracts from the journals, and they have said every absurdity that it is possible to utter on the subject, from the "Times," which has gravely misrepresented my paper, down to a journal which writes, "Major Walker thinks that fleets are all nonsense." It is into the arena of a discussion conducted on these principles, mind you, that we bring down the question by discussing it here, and it is into this arena that we bring the discussion as to whether there is any difference of opinion, or any discrepancy between the Army and Navy. I, for one, think it is a mistake. I think, under the peculiar circumstances, I was bound to make some

answer to Admiral Colomb, but I regret excessively having been obliged to do so. I regret excessively that Admiral Colomb obliged me to do it.

Admiral COLOMB: That is what I wanted.

Major WALKER: That is so; but I think it is a mistake, because you cannot convince people who are absolutely ignorant. What is the position the "Times" took? The "Times" must surely know that there is not a gun mounted in any fortress of the Empire that is not done by the authority of a Board which embodies all the highest Officers of the Army and Navy; then what is the use of saying the Navy are not consulted, and money that ought to go to the Navy is squandered upon forts? Everybody is consulted, and although I may agree, and do to a very large extent, with Admiral Colomb, still I say that neither Admiral Colomb nor I can change the whole administration of the Navy simply because we happen to disagree, if we do disagree, with what is done by the higher authorities. It is done by authority, and by the authority of the highest Officers of the Army and Navy.

Admiral COLOMB: Without any central control.

Major WALKER: I fully agree with what Sir Lintorn Simmons said about the control, but we cannot help it. The "Times" goes full charge at the War Office; but it is not the War Office; it is the Army and Navy together who are responsible for things as they are, or is it not rather the system by which both Army and Navy are controlled?

Admiral Sir HOUSTON STEWART: I think we owe a debt of gratitude to Major Walker for one sentence. I am now sorry that I have not taken part in this discussion. It is this: "A satisfactory defence of the Empire can only be obtained by a just combination of all the elements of defensive strength, ships, fleets, material obstacles, organization of men;" and it ought to be put up in golden letters over our spending departments, and in the House of Commons; gold is the colour that stands best the damp and foggy climate of London. I for one tender my best thanks to Major Walker for embodying in his lecture a truth which is the whole point, and, to my mind, unassailable.

Major WALKER: One more word: Lord Wolseley has asked me to point out, in his unavoidable absence, with reference to the question he raised here regarding the invasion by William III in 1688, that there are very strong proofs, amounting in fact to certainty, of Dartmouth's fidelity to James II, and of the full intentions of the fleet to fight the Dutch if they encountered them. That the fleets did not meet was due, as we all know, to the "Protestant wind," as it was called, which, while favouring William's movements, kept Dartmouth wind-bound in the Gunfleet till too late. I cannot at this late hour detail all the movements of the fleets, it will be sufficient to quote James II's own letter to Dartmouth, written on the 9th November, 1688, in which he says, "Nobody could work otherwise than as you did; I am sure all knowing seamen must be of the same mind." And James was himself no mean authority on such a point. And Dartmouth, speaking to Burnet after the event, says, "that whatever stories the Dutch might have heard of Officers or seamen, he was confident they would have fought very heartily."

The CHAIRMAN: Bearing in mind all you have heard, and looking at the clock, I shall confine any remark I have to make within the smallest possible limit. As far as my memory serves me, Admiral Colomb, either in the paper which he read on the 1st March, or in the remarks with which he prefaced it, said that his great object was to raise discussion, and if so, I think we may congratulate him on the realization of his intention, for we certainly have had not one discussion, but four discussions, and those really of a very exhaustive character. Now just one word as to what is the result of all that has been said upon the recent occasion in this theatre. I think we may safely say that we are all of one opinion as regards principles; but that with regard to details there has been a difference of opinion. We hold, I think, both soldiers and sailors, that the supremacy of the Empire on the sea must be maintained at any cost, and even at the sacrifice of any existing interests. Then I think we all agree that there must be fortifications for the protection of our maritime arsenals, and also for the coaling stations. With regard to the extent of these fortifications there is a very great diversity of opinion. Some hold that it is merely necessary that they should be of such a character as to beat

off raiding armed cruizers: others think that this is not sufficient, and that the fortifications should be able to make resistance to a much more formidable attack. I confess I think the latter view is the safer, but that is a very different thing from affirming that fortifications can be a substitute in any way for the naval forces of the country. To hold such a view as that would be a great mistake, and in order to avoid that mistake it has been well said, more than once, during the discussion, that we should not term our maritime fortresses a second line of defence, because that implies that they are of greater importance than they really are. I conceive that they should be looked upon as protected bases of our naval operations. That view, I think, stamps our fortifications as to their utility, and I am quite sure that if the thought should ever arise of doing away with them, the men who would be the very first to protest against such a measure would be the Officers of the Royal Navy. I repeat that we are all of one mind, that the supremacy of the country at sea is the main thing to look to, and we must take care to insure that Britannia, whether she "needs bulwarks or does not need them," is able to rule the waves. I have nothing more to do than to propose a vote of thanks on the part of the meeting to Major Walker for his very able paper.

Friday, May 3, 1889.

LIEUTENANT-GENERAL C. C. FRASER, D.C., C.B., M.P., in the Chair.

HORSE ARTILLERY.—LECTURE 2.

By Captain W. J. ROBERTSON, R.H.A.

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- PART 2.—Secondary use of Horse Artillery.
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It was my privilege on the 4th May last year to give in this theatre a lecture on "Horse Artillery,"¹ a step that caused me many hours of anxious foreboding and thought, much friendly counsel to abstain, and very many hours of pleasant research. I undertook myself-imposed task because I was thoroughly imbued with the idea that, of all parts of the Service, the Royal Horse Artillery stands most in need of augmentation.

Let me commence by saying that not for one moment will I allow that I am at all forgetful of the great use of the artillery itself, but I find friends of the arm standing up and defending it, in every direction; with the horse artillery in the British Army it is different, and the allusions made to it in papers on artillery are usually summed up in a few sentences. In my last lecture I thought it wise to confine my remarks largely to the past. I gave a short historical account of how the arm had been created and used in the olden days. Then I gave further examples of its primary use with a cavalry Division, its secondary use with the Corps Artillery, principally taken from the war of 1870, and in the last part, treated of the impossibility of any other arm performing its rôle.

The lecture met with little hostile criticism; several cavalry soldiers spoke strongly of the absolute need of horse artillery in the various phases I had indicated, and all present deplored that we possessed so little of it. The only real criticism I met with proceeded from an attack on the veracity of one of my tables, viz., the strength of horse artillery in various armies—a point that I will allude to later.

I come before you again this year from believing the fact that, as an

¹ See Journal, vol. xxxii, page 609, *et seq.*

army, I do not think we believe, in horse artillery. I fear no contradiction in saying that the British Army places a lower value on the effect produced by artillery fire than either the German, French, or Russian; and if this be true of artillery fire in general, it is still more true of horse artillery fire in particular. And the reason for this state of affairs is easy to seek. The British soldier, unlike his European *confrère*, has never stood under a heavy artillery fire from modern guns. A glance at our foes in the last twenty years, numerous as they have been, will at once prove this. Maories, Zulus, Affghans, Boers, Egyptians, Soudanese, all have been deficient in a properly trained and mobile artillery. But if we ask the French for instance, we find Napoleon III excusing himself at Sedan not on account of the Prussian numbers but on account of the fire of the German artillery. If we ask the Germans, we have the greatest master of artillery commencing his famous letters with the sentence, "You quietly, my dear friend, put to me a very grave question, when you ask me—'What is the reason that our artillery, which in the campaign of 1870-71 did such excellent service, failed altogether four years before?'" And if we ask the Russians, we have that truly remarkable man, General Skobelev, when sent to Central Asia, insisting that he should have plenty of artillery. But if this be at any rate with us admitted by a few outside the Royal Regiment of Artillery, hardly any remember that it applies equally to the fire of guns when cavalry are acting independently.

The honest fact is, that in peace-mancœuvres horse artillery is simply in the way. A necessary evil perhaps, but an evil still, it may hamper the cavalry Division or brigade, it certainly cannot hasten its progress. It may be the cause of blame, it cannot be a matter of praise; hence, as a rule, when employed in this way, we horse artillery exist simply on the sufferance and goodwill of the principal arm, and on the customary traditions of the past.

Looked at in the light of military history, the next war between two Great Powers will have consequences perhaps greater than any that have gone before; this will be due more to the great and rapid changes in material than to the years that have passed since the last conflicts. 1870 was thus nearer to the wars preceding it than 1870 and 1878 are to 1889.

In the present age of patents and discoveries war becomes far more a problematical game than at any period of the world's history.

Among the many theories waiting to be proved and tested by rough experience are two specially bearing on the subject of horse artillery, namely, the cavalry screen and the use of shrapnel; and let no one say that it is useless speculating on such subjects, victory will rest with that Power that has adapted its forces and trained them for the work to be performed in the coming fight.

The War of 1870 taught four great lessons:—

1. The power a well-defined mobilization of a nation's forces on war strength gives in the initial phases of the struggle.
2. The impossibility of troops moving in close columns to withstand infantry fire.

3. The great use that artillery can prove if brought early into action, properly massed for the artillery duel, and moved up to close ranges, in the infantry attack.
4. The new use of cavalry when thrown well to the front, to hide one's own movements, and to discover those of the enemy.

The whole of these four lessons were well learnt at the time. The first two are still remembered, and are never likely to be forgotten, all nations have more or less profited by them, as shown by their armies at the present time. The third was obscured by the war of 1877, and few perhaps, except artillerymen, recognized that it was to the bad shooting made by the combatants, inferior armament, and radically unsound principles on which it was used, that the want of effect of artillery is to be ascribed.¹ In this light the coming war may prove (certainly if the Prussians are engaged) the glorification of the "mighty shrapnel," as Prince Kraft terms it. The fourth was well digested at the time, the Prussian Uhlan was a terror to the French, the pride of the German, and an example to the rest of Europe; but none the less gradually and quietly forgotten. The reason for this is not far to seek. Horses are expensive, hence nations like to keep as few cavalry soldiers as possible during times of peace. To counteract this, constant and frequent notice of the great use of the cavalry should be perpetually made, but as the use of the pen is chiefly made by Generals and Staff Officers who have often had little experience of the branch, this is not done, and the cavalry soldier is quietly shelved.

This is particularly the case with us as a nation, who are perpetually engaged in small conflicts with savage nations where infantry chiefly is needed.

We find that it was not till the earliest phase of the war of 1870 had passed that the discovery of the use of the Uhlan was made. But gradually the power of the Prussian cavalry was felt, and from the time they crossed the Moselle, they were pushed far ahead into the very heart of the enemy's theatre of action, paralysing his forces, terrifying the country people, and allowing the German leaders to deliver their blows when and where they liked.

When the campaign of 1870 is looked back upon, it is the use of the cavalry that stands out pre-eminently as unique.

But it must be remembered that the French did not use their cavalry in the same manner, it was kept back in the old traditional way for use on the battle-field; thus it never happened during the whole war, that a French cavalry Division met a German one in advance of the main body. Had the same use been made of the arm on both sides, great masses of cavalry would have been sent to the front, which would have fought obstinately for the ground, and whichever side conquered, would have reaped the overwhelming benefits which were secured by the Prussian cavalry with scarcely a blow.

¹ There were a few exceptions, witness Aladja-Dagh, where the effect of the shrapnel fire of the Russians is described by all as truly remarkable.

It was this absence of struggling that somewhat obscured the use of horse artillery in the cavalry screen.

But the importance of quickly getting the upper hand in this preliminary conflict has not been lost sight of by some of the European Powers, for it conveys the advantages of hitting a blind man with your own eyes open; and as cavalry aided by horse artillery must push back cavalry without guns, it is to the horse artillery that we have to look for this great and stupendous advantage. In such a position another battery of horse artillery may be worth its weight in gold; six guns one way or the other may turn the scale. I purpose, therefore, going rather further into the uses of horse artillery with the cavalry screen than I did last year. Napoleon had stated in a despatch to Paris after the initial reverses of the war, that he intended falling back "on our impregnable positions on the Moselle." Prince Kraft observes on this, that he has not yet seen in any military work any observation on the importance of the rapidity of the German cavalry's movements which had on the 13th August reached this river, thus forestalling the French in their intention of occupying this formidable line of defence, although in possession of a line of railway. If the enemy had been given more time to destroy the bridges of the Moselle between Metz and Nancy, fortifying its more dangerous passages, the events of the fateful days that followed might have been very different. But the fact was that all through the campaign the French quietly acquiesced in having their eyes thus blinded by the German screen.

The services rendered by the German cavalry from the 6th to the 13th August were great in the extreme to the invaders, but it was after the Moselle had been crossed, that their importance was still more fully shown.

The 5th Cavalry Division with the Guard Cavalry Division, about sixty squadrons in all, was pushed forward, after crossing the river at Dieulouard and Pont-à-Mousson, to Jarny and Rezonville, on the line of retreat of an enormous and as yet only partially defeated enemy, bivouacking 9 miles in advance of the only infantry Division that had yet crossed the Moselle.

It was on the following morning that the well-known surprise of the French camps at Rezonville and Vionville by the artillery fire of the 5th and 6th Cavalry Divisions took place.

On the 17th a brigade of the Cavalry of the Guard advanced as far as St. Mihiel on the Meuse, and reconnoitred the ground further west, thus giving two good days' notice of any attack that might have been in contemplation on the main body, and allowing the whole of the German forces between the Moselle and the Meuse to change their direction if necessary to the west or north with perfect safety. But as yet the cavalry of the attacking and invading army was only learning to use their wings. On the 24th August, when the German scouts had ascertained that the camp at Chalons had been abandoned, the cavalry Divisions that furnished these leading patrols were actually upwards of 40 and 45 miles from their corps. But as the cavalry columns drew nearer to Paris, where resistance might be looked for,

they had somewhat diminished this distance, and were only 27 to 30 miles ahead.

In the next European war, we are likely to see the commencement made with large masses of cavalry thrown forward on either side struggling for the mastery, and the victor driving the vanquished back till the former is from two to three days' marches ahead of his own forces; thus keeping the enemy in ignorance of his movements, while enabling his own attacks to be made when and where he likes, affording security and restful nights to his own infantry and artillery, and harassing, on the other hand, those of the enemy. Let us just remember in passing what this entails in the way of mobility, ammunition, and independence on the part of the batteries of the horse artillery employed with the screen on this duty.

But we must also bear in mind the cavalry raids that are likely to be attempted, and perhaps successfully carried out in the war of the future. The War of 1870 and 1871 gives us no example of this, from the fact that it can rarely if ever be attempted in an enemy's country. But the French, if they had had cavalry Divisions to use for this purpose, might have wrought irrevocable damage upon the invading hosts if the raids had been boldly carried out. The Prince, in his "Letters on Cavalry," says in his own inimitable style:—

"Imagine a raid by a French cavalry Division from Dijon by Langres, Bar-le-duc, St. Menchould, and Rethel to the northern fortresses. Favoured everywhere by the inhabitants, and warned in time of any threatening danger, hidden for many nights in the forests of Argonne, attacking and annoying our line of communications at such spots only as they knew from the people to be occupied by few or none of our troops, such a cavalry Division would have done us infinite harm; it would have disturbed our communications, destroyed the railways, cut off our supplies, burnt advancing provision columns, &c. . . . Such a raid, assisted as it would be in every village and in every town by its sympathizers, might produce extraordinary results; it might even, suddenly appearing in districts at a great distance from each other, serve as a nucleus around which those sympathizers might flock together, and thus 'call armies out of the earth by a stamp of the foot.'"

Such raids as this may yet play a great part in our defence of India, should our hold there ever be really menaced by foreign armies on its soil. But we have not to look to imagination alone for such an attack. Deficient in ability and skill as the Russian cavalry proved themselves in the War of 1877 and 1878, especially in securing knowledge of the enemy's intention and of harassing their retreat, as for example in the withdrawal from Tashkessen, yet they give us one grand example when properly led of a true cavalry raid.

General Gourko, in his admirably conducted movement on the Schipka Pass, had in less than a month gained possession of one of the principal passes over the Balkans from which they were never afterwards driven, while it was used in January for the crossing of a large portion of their army. But, besides this most material advantage, he had created almost a panic throughout the whole of Turkey

in Europe, subsisting on the country, and spreading destruction and disorder in all directions, uprooting telegraphs and railways, and collecting valuable information from all sides.

It is true that in this raid a large body of infantry (the force was composed of 8,000 infantry, 4,000 cavalry, and 32 guns) were used, but it is doubtful whether their presence conduced much to the success of the expedition after the pass was secured; their part was to hold open the door of the orchard while the cavalry secured the fruit, and in many cases it is conceivable that the cavalry Division will be able to play this part of the game also.

But, alas! this is the only use in a positive sense we can make of the Turco-Russian War of the use of cavalry, though we have abundant instances of its negative value.

Thus, with reference to advance guard work, Major G. S. Clarke informs us that though General Skobelev with a flying detachment seized the bridge over the Sereth at Barboschi on the 24th April—the Cossack cavalry having started at 3 A.M., and reaching the bridge at 9 P.M., after a ride of nearly 65 miles—yet Plevna, only 35 miles from Sistova on the Danube, was not touched by cavalry patrols till three weeks after the crossing of the Danube! What a difference is this to the work of the Prussian Uhlán, yet the failure was not due, as we see, from want of mobility—65 miles in eighteen hours will require no bad battery of horse artillery to keep up.

Again, had the Turks after the first battle of Plevna possessed a sufficient cavalry force of the stamp they used to possess, the disaster to the Russian arms might have been complete. The pontoon bridge at Sistova was only 35 miles distant, and might easily have been seized for ought that the Russians could have done to prevent it. While the defeat after the second battle was such that a panic did occur there, notwithstanding the absence of any pursuit, and General Richter had even to bar the bridge by force of arms before he at last succeeded in allaying the alarm.

Had a single Prussian cavalry Division been present that day, for instance, the 5th under General von Rheinbaben, with its four horse artillery batteries, as on the morning of the 16th August, 1870, what a different ending the war might have had! What a hurrying and haste would have been seen among the already discomfited Russians; with the bridge firmly held, all the troops on that side the Danube would have fallen a prey to their hitherto despised enemy, and the great river might not have been so easily crossed again.¹

Nor were the Russians themselves better qualified to take advantage of a pursuit. Usually their cavalry never attempted to follow up a success, and though at times they did reap some advantage from thus pushing their successes, as for instance at Lovtcha, where the Caucasian brigade, with its Cossack horse artillery battery, claimed to have destroyed some 3,000 of the enemy by shrapnel fire, yet it never encouraged them to do more in the future, and time after time they

¹ Major Clarke estimates the Turks at 35,000, and the Russians at 22,000, at this time at Plevna.

allowed the Turks, who were almost absolutely deficient in the arm, to slip away from their fingers.

Valentine Baker writes from his own experience as follows: "The Russians had the great advantage of immense superiority in cavalry, acting in a country which was admirably favourable for its development, but they failed to derive the slightest benefit from this superiority. During the retreat of the Turkish forces, which terminated the campaign, endless opportunities were constantly occurring for the effective use of the Russian cavalry. When the Turkish armies fell back from the Balkans in a slow but almost uninterrupted retreat to the *Ægean*, almost destitute of this branch of the service, their movements might have been utterly hampered by active cavalry operations on the part of the enemy. As a rule, the outposts of the two armies were in actual contact, the main forces being separated by a comparatively small distance, yet on no single occasion did the Russian cavalry ever seriously press the retreat of the Turks."

The absence of this pursuit on the part of the invader is the more unfortunate, from a military history point of view, from the fact that it has prevented the weakness of the Turks in this branch of the service being much commented on. If there is one phase of action in which a properly provided cavalry force is useful, it is in the *rôle* of covering a retreat. This was the one duty that the German cavalry in 1870 never fulfilled. If the Russian cavalry had risen to the occasion, had, for instance, Skobelev been charged with this duty, we should have heard more of the fatal want of cavalry stiffened with horse artillery on the part of the Turks.

In outpost duties, again, the Russians were lamentably wanting. General Valentine Baker, after his gallant and plucky defence of Tachkessen, was allowed to slip away with an ease that is simply incredible. Captain Greene, in his work, sums up this in one line:—

"On the next morning, January 1st, the Turks could not be found."

Once more let me bring to notice the utter failure of the Russian cavalry in preventing supplies from entering Plevna and in carrying out the investment on the western side. General Kriloff had as much as 56 squadrons and 30 horse artillery guns under his command from the 19th September till the 7th October, yet about all that he accomplished was delaying a force of 10,000 men for two days. Major G. S. Clarke remarks in his wonderfully interesting account:—

"The task of preventing the provisioning of Plevna could only be accomplished in two ways—either taking up a defensive position on the Plevna-Orchanie line and waiting to be attacked, or by rapid movements and vigorous offensive tactics. The latter course was the most natural *rôle* for a cavalry force. The country was favourable for the employment of the arm, the distance from Orchanie to Plevna considerable, and, except the *chaussées*, few if any lateral routes appear to have existed by which heavy transport was practicable, while a long train, extending over more than 7 miles of road, was not very easy to defend against a strong cavalry and horse artillery force. . . . Of the two tasks allotted to General Kriloff, the cutting of the Plevna communications and the sparing of his

troops, he had only succeeded in fulfilling the latter. After the great losses of the 11th and 12th September, it was natural for the Russians to wish to avoid further sacrifices, but fully admitting this, and also the difficulty of cavalry operations against modern infantry, it seems nevertheless that a *grand* opportunity for a brilliant and dashing cavalry General existed, and that it was lost."

I have given here more prominence to this failure from the fact that it would seem as if here too a new and important work is likely to be given to the cavalry Divisions, namely, the investing large sectors of fortresses in the future. Major G. S. Clarke himself quotes—and he is no mean authority on such a subject—a passage by Captain von Widdern, that—

"In future wars armies will often find themselves in front of fortresses which, on account of the extent of their works, cannot be completely invested. This observation applies especially to France as a theatre of war, where . . . the task of observing much of their fronts and of intercepting their communications will be left to that mobile force *par excellence*, the cavalry."

For instance, a second siege of Paris will have to be very differently conducted to the last. The extent of the surrounding forts, now reaching to 104 miles, makes the necessity of leaving the investment of a large sector of the cordon to the cavalry an absolute necessity, and should an attempt to get in or out be suddenly made, to the guns of the horse artillery will have to be entrusted the detaining the disturber till other and extraneous aid appears. The cavalry Division will thus have, by constant and rapid changes of position, to deceive the enemy as to their strength and locality.

These are some of the ways in which cavalry Divisions are likely to be employed in the future when on detached service. Let us, therefore, now look a little into the duties required from the horse artillery attached to them; and it must be remembered that though only a proportion of the batteries may be thus employed, yet every horse artillery battery must be so fitted as to take its place when wanted in the cavalry Division.

Three things, then, are specially needed: 1st, the power of keeping up with the cavalry at all times and places under every circumstance of bad roads and wet weather; 2ndly, its ability to hit when asked to do so; 3rdly, its supply of ammunition in action.

With reference to the first condition, we have already had one instance of what General Skobelev demanded and obtained from his cavalry on a special occasion, 60 miles in eighteen hours. Prince Kraft, in his letters on cavalry, states:—

"1st. A squadron must be able to get over $4\frac{1}{2}$ miles at a rapid pace (trot or gallop), and must then have sufficient power left to make a charge and carry it through.

"2nd. Certain picked horses must be able to march great distances, say from 50 to 60 miles in a day, and thus it must be possible to carry out extended patrolling.

"3rd. The larger masses of cavalry must be in a condition to make long daily marches, and should certainly, to give figures, be able to

advance for three days at the rate of from 28 to 30 miles per diem. If these marches are to be continued for more than three days, the daily amount should be diminished, and if on any day the cavalry are asked to do more than usual, then the next day must be either one of rest or only a short march must be made on it.

"These exertions, whether of a single squadron or of a cavalry Division, must have *no influence* on the tactical efficiency of the force making them.

"This is not too much to ask. The cavalry can do it, have done it, and will do it, whenever they are asked, if only they are allowed the means to do it."

I would specially draw your attention to the words "no influence on the tactical efficiency of the force."

If Prussian cavalry can do it, and will do it, we may take it, I presume, that we must be able at least to do as much, even if we are contented not to do more, but it means a good deal, viz.:—Taking a horse artillery division with all their spare carriages and line of wagons 90 miles in three days and then having enough sound horses not to impair one's tactical efficiency. It means the guns being asked to do an occasional 60 miles a day, and some of the Officers and men sometimes riding close on 90 miles in the twenty-four hours.

One is proud of being able to say, like the Prince, "they have done it." Last year I alluded to Captain Rodber's march of 95 miles in thirty hours, and his tactical efficiency was so little impaired, that he fought a battle at the end of it; and I have lately had my attention drawn to another battery in India that sent three of its guns, in September, 1857, from Mean-Meer to Gogaiva, a distance of 70 miles, in one march of sixteen hours, to save the Treasury there. The battery was then known as the 3rd Troop 2nd Brigade, Bengal Horse Artillery, lately L | B, R.H.A., one of the batteries recently reduced.¹ While, I believe, G | B this winter marched 166 miles from Neemuch to Mhow in 104 hours, without injury to horse or man. I allude again to the subject this year, as the mobility of horse artillery must never be lost sight of.

Having got the guns into the right place, the next thing is for them to be of use—they must hit; and this introduces what I have alluded to above—"The mighty shrapnel."

The subject of accurate and well-directed shooting from field-guns is one that some cavalry soldiers are inclined to pass by as one concerning the artillery alone. This is surely a mistake. First it concerns them much as a partridge is concerned with the shooting powers of fowling-pieces; secondly, as one is personally interested in one's friend's ability to hit when after tiger with him. If two cavalry Divisions of equal strength are engaged together, and the artillery of one hits nothing and the other shoots really well, victory is likely to be assured to the latter, while it will be cold comfort to the horse artillery of the former to know that it did nothing effectual because it was assigned an impossible task by its cavalry General. Not that it is

¹ From the records compiled by the present Inspector-General of Artillery in India, Brigadier-General Nairne, C.B.

necessary for a cavalry leader to know technical details connected with artillery, but it is absolutely essential for him to know when and where he can rely on his guns, in order that he may use them as a weapon for attack and defence. Let us then briefly consider the three kinds of projectiles with reference to a cavalry engagement.

Each case-shot contains about 314 bullets. There are six rounds (two with gun and four with limber) present with the gun. Owing to their proximity and the absence of any required preparation, the whole thirty-six rounds could be fired while cavalry are advancing on the battery during their last 500 yards, for four rounds per gun can be fired in a minute. After leaving the gun the case-shot bursts, the bullets form a cone and strike the ground in the shape of an oval. The harder and smoother the ground, the more effective will be the result of the fire, as the balls will ricochet. The lateral spread can be roughly given as—

Range 100 yards.....	17 yards. ¹
" 200 "	24 "
" 300 "	42 "
" 400 "	53 "

As the guns stand at about 20 yards interval their fire thoroughly sweeps the whole front, and consequently a front attack either from cavalry or infantry *can never* be successful if the gunners are prepared for it. Before dismissing case one may remark that it is a similar projectile to the old canister. For its effects, therefore, we can turn to history.

Not so, however, with shrapnel, our next projectile to discuss. Here, owing to rapid modern improvements, we have nothing to guide us but that fallacious test—the practice ground.

In the war of 1870 and 1871 little shrapnel was used, so little as to be useless. Thus on the 16th August out of 6,259 rounds fired by the German horse artillery only six were shrapnel, and on the 18th August out of 8,538 only nineteen were shrapnel. In the Turco-Russian War more shrapnel were used, but the fuzes were bad, the way the guns were employed worse, thus little reliable data are to be found.

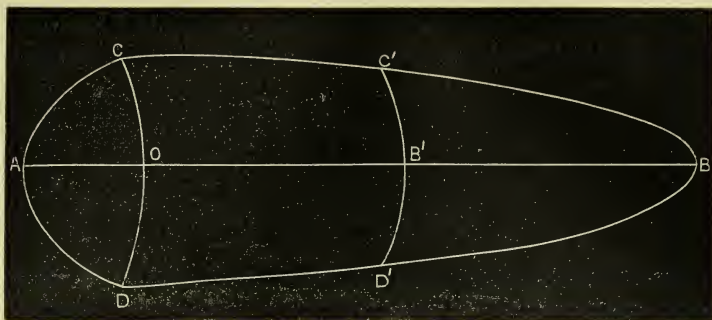
I shall allude directly to the enormously destructive power of common shell, as evinced in the Franco-German War, but must here state that the destructive power of shrapnel on men and horses over common shell is (we gunners affirm) something like as 5 to 2, when used in conjunction with a good time fuze, and we now pride ourselves on having the best in Europe—the T. and P. short.

The following figure shows the ground covered by the bullets (177, weighing about 5 lbs.) after they have hit the ground and before they have ricocheted.

Half the bullets will fall on either side of COD. The effective beaten surface is that comprised between ACC' B'D'D, and is all that

¹ See Major Eden Baker's "Notes on Tactics."

should be taken into account. As the range increases the frontage covered by the effective bullets (CD) increases, while the depth covered



(AB') decreases; a similar effect is produced by increasing the length of the burst. This is shown by the two following tables.

50 Yards Short Burst.

Range.	CD.	AO.	AB'.
500 yards	12 yards.	45 yards.	400 yards.
1,000 „	17 „	42 „	377 „
1,500 „	21 „	37 „	344 „
2,000 „	25 „	35 „	337 „
3,000 „	29 „	29 „	291 „
3,500 „	27 „	27 „	200 „

100 Yards Short Burst.

Range.	CD.	AO.	AB'.
500 yards	14 yards.	90 yards.	410 yards.
1,000 „	22 „	83 „	356 „
1,500 „	30 „	74 „	319 „
2,000 „	37 „	69 „	296 „
3,000 „	42 „	59 „	270 „
3,500 „	42 „	55 „	256 „

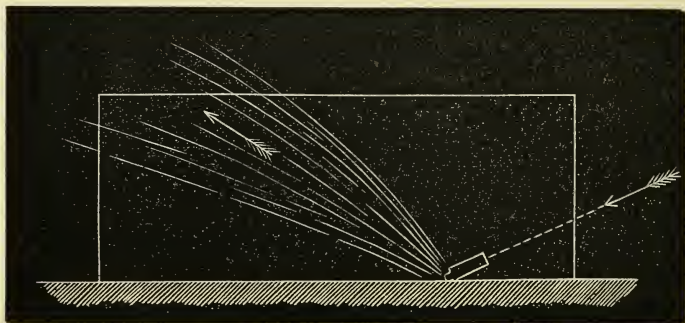
The practical effect of this is shown by the large amount of ground covered by the bullets of a shell. Thus a squadron of cavalry in squadron column advancing on a gun would at 1,000 yards distant be within the effective zone for 377 to 356 yards, according as the shell was burst short or long. This shows how very difficult it would be for the gunner to miss doing some damage, especially when it is remembered that it is always easy to hit the right direction, the difficulty has been to ascertain the range.¹ When it is further considered that on hardish ground all the bullets which fall in ACOD will

¹ I have taken these tables from Major Eden Baker's valuable work on "Preliminary Tactics." Till my attention was drawn to it I had a much hazier idea of the action of shrapnel.

ricochet so as to supplement the bullets already fallen in the greater space CC'D'D; while those already there will ricochet further yet, the ground covered by each discharge of the battery (six rounds) will be very considerable, as can be seen in Fig. D (Plate). The leading regiment is here shown in line; in line of squadron columns it will be far more exposed.

Besides being burst in the air with a time fuze, shrapnel can be made to burst immediately after impact with a percussion fuze. This entails less preliminary preparation, which is, however, of little consequence, for when an enemy is advancing on the battery, shrapnel can be brought up and laid handy with their time fuzes set for ranges differing by hundreds of yards.

Effect is here taken alone of the bullets ricocheting, as in the diagram. It is very much more effective at the shorter range, both



from the greater striking velocity and smaller angle of descent. With percussion shrapnel the cone of dispersion of the bullets, unlike that of time shrapnel, acts upwards; the result being that many of the bullets fly too high to be effective, and when they descend again are practically useless from having lost too much velocity. The worst feature, however, regarding the use of percussion shrapnel is that when the range is not very accurately known, the result produced will probably be *nil*. By some, great reliance is placed on percussion shrapnel; I own myself to being prejudiced against its use with a cavalry brigade, owing to the quality it possesses with time shrapnel of all absence of noise. It used to be said that artillery fire was principally felt in its moral effect; since the late Franco-German War, however, this can no longer be alleged, while shrapnel has even since then enormously increased its man-killing properties, but unfortunately in moral power some of its increased effect has been counterbalanced in two ways: first, the terrible wounds inflicted by round shot, that used to shake men's nerves, no longer occur; secondly, the loud reports of the shell bursting have been exchanged for slight puffs. A good instance of the former is given in Mercer's "Journal of Waterloo," where a single horse struck by a round shot seems to have produced a more sickening effect than the large number of men killed and wounded

later. In time of peace, probably few are aware of the loud noise made by a common shell bursting. At one station I was in there was a large and substantial splinter-proof shelter for a range party. One day when on range I placed the target just behind the splinter-proof where we were, and observed that when shrapnel was fired I had some difficulty in preventing the other members of the party from putting their heads out to see what was going on, but when common shell was fired there was no necessity for saying a word, nobody wanted to move. A horse that stood fire perfectly I also took into the butt, and when common shell was fired and burst near, we had some trouble in preventing him from breaking loose.

I own, then, when firing at cavalry to have a fancy for common shell owing to the disturbing effect it is likely to have on the horses.

Nor am I alone in this. Von Schell (Chief of the Staff to the Inspector-General of the Prussian Artillery), says: "Against rapidly moving objects, such as we encounter in a cavalry action, shrapnel is too difficult to manipulate, in addition it is no easy matter to follow the enemy's movements with it, while the comparatively long time required to load with this projectile does not conduce to rapid shooting."

The small puff of the shrapnel, too, horses will not notice, but the loud report of the common shell, bursting with unexpected and lightning-like rapidity, will startle many of them, rendering them most unmanageable. It is unfortunate, however, that the 12-pr. steel common shell may only break up into three or four pieces. On the other hand, if shrapnel is so destructive in killing men it may have a ten-fold effect on horseflesh at times. For instance, at Vionville, the artillery lost in killed 29 Officers and men, 228 horses, nearly seven times as many; at Gravelotte, 26 Officers and men, 324 horses, over twelve times as many. Now, if this was the proportion where the horses are often under cover and the men usually, if not invariably exposed, in the cavalry we may expect great losses in horses from artillery fire.

A good instance of the destructive effect of common shell against horses is mentioned by Prince Kraft; he says:—

"At one moment something was seen moving to the right in the forest of the Ardennes. By the help of field-glasses this was made out to be some cavalry marching in two ranks towards the north, and passing through a clearing in the forest on the hill. The batteries endeavoured to find the range. With elevation for a little more than 4,000 yards we appeared to hit. I considered that the range was too great for the fire to have any effect, and I was about to order it to cease, when an evident disturbance in the ranks of the enemy proved that our projectiles had reached him. We continued then to fire slowly at this moving target, as long as it remained visible. On the following day, Lieutenant v. Kaas, while doing duty as aide-de-camp, passed by this point, and found on a narrow crest which ran between very steep ravines an entire French battery which had been abandoned there. The team of the leading gun had been blown to pieces by our shells, and the other guns could not pass it; thus the whole battery fell into our hands a trophy of the accuracy of our fire."

Yet this gun could not be compared with our new 12-pr. B.L. in range, shooting power, or accuracy.

In Fig. C (Plate) I have taken an illustration of two cavalry brigades advancing directly on one another, one of which has a horse artillery battery. I have presumed that the battery gallops straight to its front, coming into action at a distance of 1,300 yards from the enemy, who, up to this, would be only pressing forward at the trot, now changed to a slow gallop of 12 miles an hour.

When he is at 400 yards from the guns, they cease firing on the leading line, having been able during the 2' 40" of its advance to fire 18 rounds of shrapnel or 24 of common. If the former a total of 2,180 bullets. Its own cavalry then are in position to charge themselves on this advancing line shattered more or less by fire, with gaps in its ranks, and horses unsteady; the battery is then able to turn its attention to the 2nd or 3rd line according as its fire is less masked by its own troops. These would be still 650 and 1,000 yards off. Thus, there would be ample time for it to deliver an effective fire before its own 2nd and 3rd lines became engaged. The best thing that could happen would be for one of the lines to attempt to charge home, thus rendering it liable to a heavy loss from case, and being attacked in its turn by cavalry when its ranks were more or less opened out to avoid the guns' fire. Fig. D shows the same attack when near with the effective zone of a round of shrapnel marked against it.

In Fig. E, I show the same encounter, only the battery's cavalry are at first masked by a fold of the ground, hence, after the battery has galloped forward and begun to fire, its opponent finds that he has to change direction to his right, in order to meet the opposing cavalry on his right flank. Here the horse artillery would have an even better opportunity, and would be able to continue its fire almost up to the very moment of encounter.

Explanatory Footnote to Diagram.

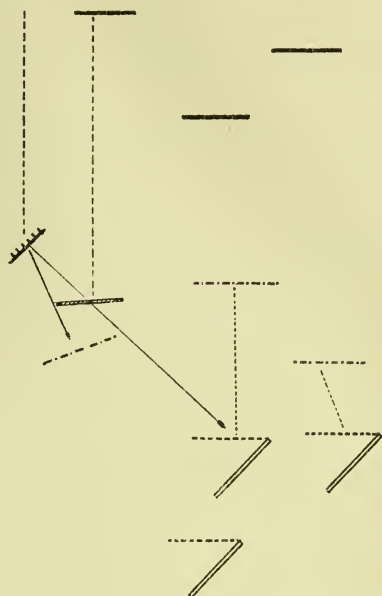
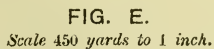
The distance from the battery to the first position is taken as 1,300 yards, when firing begins, it is continued to the second position, 400 yards off. The time taken to advance this 900 yards is $5' \times 900 \div 1,760$, *i.e.*, 2' 37". If we allow 1' for the first rounds, and 45" for the rest, this will give 3 rounds per gun, or 18 rounds in all; a total of over 2,180 bullets.

I have assumed that at 400 yards firing ceases at the first line to allow its own cavalry to charge. The second line is still 650 yards off, and the third nearly 1,000. There would therefore be abundant time before the latter could charge the battery to fire at it 3 rounds of shell and 1 of case, if not 2, per gun; a total of 18 shrapnel and 6 or 12 case. If it attempted to gain a flank it would offer even a better chance of being cut up, as it would have to wheel by troops and deploy again under fire, while the battery would change front in less than a minute.

I have purposely shown here no opposing battery, as by so doing one sees better the invaluable use guns may be in cavalry combats.

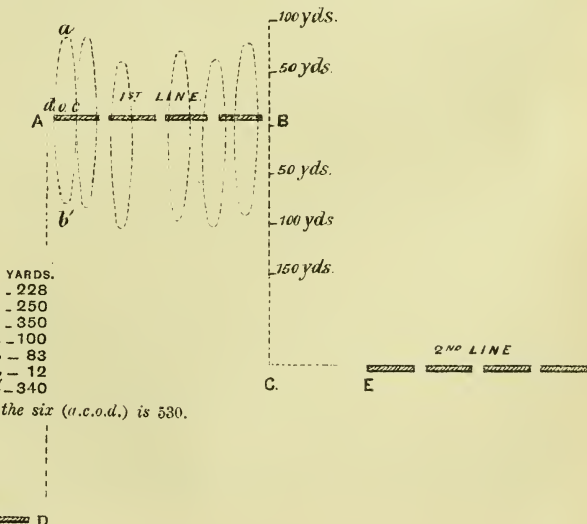
Where both sides have artillery, success is likely to result to that side which uses its artillery to most effect. In this term I include tactical advantages and good shooting. It will, as a rule, be best for the battery even to endure a heavy fire from the enemy, rather than give up firing at the cavalry, for final success must be decided by the

Scale 450 yards to 1 inch.



Scale 200 yards to 1 inch.

BATTERY FIRING SHRAPNEL AT 1,000 YARDS RANGE.



Number of bullets in the six (a.c.o.d.) is 530.

arme blanche, thus, no efforts should be spared to break the ranks of the enemy before the charge takes place. In many books on tactics one sees diagrams in which the horse artillery are shown in different places for action. A cavalry encounter takes place so quickly and ends so rapidly, that till one side is defeated, I believe the artillery will usually not change its ground after its first position has been taken up, and that if this should be a bad one, nothing can hereafter atone for it. If there is more than one battery present, they must not be separated, as by so doing, their fire-effect is less, and their risk of capture greater.

I much wish the authorities could see their way to occasionally allowing such examples as this to be worked out in practice at targets with a cavalry brigade on rough ground, when the cavalry could see for themselves the effect of our fire, and we could learn how far we could gallop ahead with the best advantage, and the best position to take up.

With reference to the third point, the supply of ammunition, there are many, I am afraid, like the German Officer who said, "As soon as you begin to talk of lines of wagons, I begin to feel ill." But yet it is a theme that cannot be confined to the artillery alone. The Divisional General must at least recognize the difficulty in carrying out the renewal of ammunition in action, and the remainder of the command must be forbearing in allowing the wagons to pass.

General Sir David Wood, G.C.B., who has seen much horse artillery work in all its phases, recently remarked to me: "You have no idea how quickly 36 rounds a gun go in action." And though cavalry actions are proverbially soon over, yet, allowing an interval of 6" per round, in less than $3\frac{1}{2}$ minutes the whole of your limber boxes will be empty. Thus, it will be necessary, even when the horse artillery brigade are on detached duties with cavalry, for the first line of wagons to be kept close to the guns. This alone, when a battery is detached, will give many a *mauvais quart d'heure* to the battery commander, as he will often be unable to spare an Officer to be with them. On the other hand, the second line of wagons need not be kept so close to the front, as there will never be occasions likely to arise when the ammunition is needed in less than an hour; while on account of the roads being fairly free, in that time they will be able to come 5 or 6 miles. When acting as corps artillery however, the second line will have to keep much nearer, both on account of the greater likelihood of being wanted, and the far more crowded state of the roads.¹

Having thus considered a few of the multifarious duties of a cavalry Division when acting alone, together with some of the requirements it entails on the horse artillery, we get to the important question as to the number of such guns needed.

To arrive at a satisfactory and fair solution of this, we can hardly

¹ In speaking of the 1st and 2nd lines of wagons, I am not alluding to the Divisional Reserve Ammunition Column, but to the battery wagons divided into two lines, as is now ordered by the New Drill Book.

do better than see what qualified experts advise. Perhaps the best we can call upon as evidence is the great master of modern artillery, Prince Kraft of Hohenlohe, of whom Colonel C. B. Brackenbury writes: "Prince Kraft is far from being a mere artilleryman. When I had the honour of being introduced to him at Berlin, he was described as the deepest student of general tactics in the whole army."

This witness is the more valuable, from the fact that, while a gunner, he is by no means too prepossessed in favour of his own arm. In his letters on cavalry, in the first nineteen there are only, I think, six allusions (each short as a rule) to horse artillery, and of these six, two are allusions to past history, and three are introduced only to prove the evil that wheeled carriages must prove to a cavalry force. While the twentieth letter, treating on the use of horse artillery with cavalry, is only five short pages, and is headed with an apology for mentioning the subject at all, which he says he does, only because he is asked. This unbiassed witness, therefore, briefly says that in the days gone by, the old theory was to attach three or four guns to each 1,000 troopers, while the German Regulations leave the question open.

The Prince declares that such a practice is founded on no solid basis, that a cavalry Division is often split up when acting independently into two or three brigades, and that as it is absolutely necessary, if a brigade has to occupy and hold its ground, for it to be accompanied with artillery, and while each of the three brigades may be thus at times so employed, in his opinion to avoid the terribly fatal error of breaking up batteries, there should be as many batteries as there are brigades. This is looking upon it from the cavalry standpoint. Turning to that of the artillery, he maintains that it is fatal to the efficiency of a battery to take its Commander away from his own battery work, to follow the General of the Division through a whole campaign; and that as one battery may frequently have to be detached from the main body for separate work for short intervals, the horse artillery Commander should never be given a less command than three batteries.

But these two double rules the Prince supplements by a third, that as far as I know, is not sufficiently considered:—

"I may sum up my opinion with regard to the posting of horse artillery to the cavalry Divisions by saying that I think that a complete brigade of horse artillery ought to be attached to every independent cavalry Division which is intended to work under the direct orders of the Commander of the army, and to be released from all control of any Corps Commander; and that this brigade should be formed exactly as it is at the mobilization, that is to say, in our case of three batteries, no matter whether the cavalry Division consists of 20, 24, or 36 squadrons, or whether it is divided into 2 or 3 brigades."

It is to this rule that I wish to call especial attention, that a weak cavalry Division should have as strong a force of guns as a strong one.

In the now famous "Letters on Artillery," the Prince is again sparing of his notices on horse artillery, though it is true that in the historical

parts in which he alludes to the services of the German artillery in 1870 and 1871, he has, for once, to be prodigal in his allusions to them.

But in the last letter, the eighteenth, published after the rest of the series, the Prince alludes to criticism on this very point that he has enunciated above, and which I have specially drawn your attention to. He says :—

“To the last letter which I wrote, you sent me the answer that if a whole brigade were attached to a cavalry Division, the latter would become too clumsy, as the brigade would be like a leaden weight hung on to it. This is quite true in theory, but in practice it is by no means the case. Three pounds are certainly heavier than two, and therefore three batteries must certainly be heavier than two. But this is not altogether correct, for three batteries can trot as fast as two. A cavalry Division fully equipped for detached duties has many other leaden weights to draw after it, all of which fetter its flight, as, for example, field hospitals and provision columns. On the other hand, the addition of one battery creates no new impediment. If only the mounted detachments be kept well closed up, if the brigade be employed as a principle only in mass, then it makes no difference as far as regards the mobility of the Division, whether there be two or three batteries. But it makes a great deal of difference as regards the fighting strength of the Division.

“In war, no Division would find three batteries too many, rather it would possibly find them too few. Did not General von Voigts-Rhetz at once increase the horse artillery of the 5th Cavalry Division to four batteries? With these Major v. Korber, at Vionville, surprised the French camps. They will only be found to be too many in peace, when no one knows exactly what to do with them.”

But if the Prince is in favour of “richly endowing” the cavalry Division with guns, he is by no means in favour of doing the same to it with rifles. He considers the number of men that can thus be sent to the front too few to have any permanent bearing on the action of large masses of cavalry: and useful as mounted infantry may prove in small wars and engagements, it would seem as if there was a large preponderance of opinion opposed to their use as summed up as follows :—

- 1st. They might sometimes lead to a muddle as regards the command of the force engaged. The Cavalry Commander is not accustomed to leading or using infantry: he will seldom have had experience in it, and might at times, while in action, be superseded by a senior infantry Officer with brevet rank, when a new procedure might occur, ending with the cavalry being improperly handled.
- 2nd. The number that can be brought into action thus is small, owing to the necessity of horse-holders. This is a difficulty that has hardly been fairly grasped. The horses must be kept under cover, hence often away from the men in action; while if artillery fire plays on them, serious trouble will result by

horses breaking loose. The difficulty, too, of forage is increased.

- 3rd. The number of horses for a campaign is limited, thus it must be proved that this is the best way of using them.
- 4th. The men will not be seasoned to ride: they will be soft and gall easily, their horses are likely to suffer from insufficient care and attention. In no way are they likely to fulfil the requisites for mobility given before.
- 5th. The best marksmen are not the best riders; while hard riding is not conducive to good shooting.

Thus it is likely to be found after a few weeks' campaigning, that the General of the cavalry Division will be wanting to take their horses from them and to give them to the cavalry, looking to his guns for defensive action.

Whether it might not be wise to consider more carefully the stamp of transport horse, so that when a necessity arises, infantry can be pushed forward in transport vehicles, is another point. Colonel v. Löbell, in his annual review on war changes, says: "A general agreement has further been arrived at on the Continent in regard to mounted infantry, which, as an organization for European warfare, does not find favour; and even Russia has modified the views previously held in regard to it. The advantages to be gained from its employment out of Europe, in Colonial wars, &c., are generally on the other hand acknowledged."

As, however, we are not likely to be beaten in any of our small wars, we can pay the less attention to this, and prepare for graver struggles.

The somewhat kindred subject of dismounted cavalry in action may be shortly considered. In large operations it must be out of place, but occasionally it may be necessary to make a feint of holding a position when the joint action of guns and carbines may have a good deceiving effect. Thus a good instance of the use that can be made of dismounted cavalry is supplied by an incident in the operations on the Upper Lom. In the Turkish advance from their position behind the Kara Lom on Biela, Colonel Valentine Baker had ridden forward to reconnoitre, and observed a large body of Russian cavalry on the point of occupying a wooded knoll that was the key to the whole position. To prevent them, not a moment could be lost, for if the Russians occupied the ridge of the wood, they would be able to see the road that ran through the valley from Sarnasufflar, and could judge of the strength of the advancing column. A young Circassian who had previously ridden forward assured him that the approaching force consisted of 3 squadrons of Cossacks, 4 battalions of infantry, and a battery of guns. The only Turkish troops near were 6 weak squadrons. Colonel Baker directed 2 squadrons to move up rapidly and occupy a small hill on the right of the wooded ridge, 2 squadrons to occupy the ridge itself, and the remaining 2 he took with him forward along the road. The Cossacks had already reached the skirts of the wood as the party arrived, but the Turkish cavalry

galloped so boldly forward that they fell back on their supports, about 400 yards in rear. Another party of Russians had also taken position on the hill on the right, but the Turks, dashing up at a gallop, threw them back, too, into the village.

All at once, at 1,000 yards distant, appeared a line of infantry skirmishers stretching right across the valley. Three battalions of infantry in column could be seen behind them, and a battery of artillery was taking up its position in rear, and at once opened fire. It was impossible for the six weak Turkish squadrons to hold at bay such a force for long if seriously attacked, but if time could only be gained, reinforcements might be hurried up. Colonel Baker therefore fell back from the open ground in front till *within* the shelter of the wood; here he dismounted some of his men, with the direction to hold the edge as long as possible, while he set about trying to obtain some support. The ruse answered admirably: the Russian columns halted and made preparations for a regular attack upon the ridge and wood. Soon a strong Turkish infantry battalion came in sight, and it was not long before they re-took the ground in front of the wood, driving the Russians hastily to the rear, pursued by the very thin line of skirmishers and the six squadrons of Turkish cavalry. Evening was rapidly approaching, and the main body of the Turkish forces being near, the position was saved.

In thus taking farewell of the horse artillery in its primary use, viz., with a cavalry Division, I have of course by no means exhausted all the ways in which it is likely to be used in the future. I have studied to represent some of its more striking features only.

PART II.

There is less need to speak of the secondary use of horse artillery, not that it is one whit less important than in what I have termed its primary use, but because the subject of corps artillery is one that is oftener spoken of in connection with artillery subjects.

But it must not be forgotten that these horse artillery batteries of the corps artillery, while called upon to perform equal work with their slower moving brethren of the field artillery, must never allow their mobility to be decreased by too heavy an armament. Not only must they be capable of being rapidly pushed into action at the call of the Corps Commander, but at any moment they must be ready to hasten on with any body of cavalry to which they may be attached. The great value now placed on the fire of artillery is thus evinced by the fact that no batteries will ever in future be allowed to stand idly by, doing nothing, whether they form an integral part of a cavalry Division or not.

So important is this *rôle* of horse artillery that I would like to draw attention to the action of General Freiherr von der Becke at Vionville, on the 16th August, 1870, who, we are told on the authority of Captain Hoffbauer, refused to allow Major Korber's two horse artillery batteries to rejoin their cavalry Division, even when summoned to do so by a special orderly Officer in the afternoon, though he had

then under his command seven other batteries, while the cavalry Division had been purposely increased to four batteries that very day, and it had been seen how useful they could be that morning when they surprised the French camps. If it be true that horse artillery is expensive to maintain, in war it is ever in use, in advance, pursuit, outpost duty, or in a heavy engagement. There are, however, some features of this secondary use I wish to mention. One is the subject of shields.

In the July number of the "Nineteenth Century," of 1878, appeared an excellent article on "Ironclad Artillery," advocating shields for field artillery. The writer, Colonel C. B. Brackenbury, founds his article, which is worthy of a far more lasting position than the pages of a monthly magazine, on the enormous effect produced in the war of 1870 by the German artillery at short ranges by guns of very inferior power, firing only common shell, but massed in large groups of 100 guns and boldly used. The effect of shrapnel by such a gun as our present 12-pr. will be far and away more destructive, provided it be possible to continue in action without losing all one's men. The writer alludes to the almost total immunity enjoyed by the matériel of loss or damage. This is shown in Appendices III and IV of my last lecture, where, on the 16th August, 1870, the German horse artillery lost 358 horses and 179 men, but had only a limber-box and a gun-wheel damaged, and on the 18th August, with 524 horses and 238 men killed and wounded, the only damage was three wheels, a pole, a breech-piece, and an axle-tree seat. Colonel Brackenbury finally recommends shields of wrought iron, soft enough to allow shells to pass through, but strong enough to give protection to the detachment from bullets and shrapnel. For field artillery such cover would often be simply invaluable, allowing the "action numbers" to remain at their guns when exposed to an infantry advancing upon them with almost total immunity to loss, at the very shortest ranges.

The only question that can arise, is to the disadvantage of carrying an extra weight. Two plans suggest themselves, one to have the shields attached permanently to the gun-carriage, so that they would lift up on hinges, to cover a man's head and shoulder—for instance, the top of the axle-tree seat could thus lift up towards the muzzle; or the shields could be made removable and carried on a separate cart or wagon. I am not now speaking of field artillery, but have introduced the subject because I believe that it will eventually come into universal operation, and if so, it is clear that if horse artillery batteries are to take their place in line with field batteries it will be necessary to give them the same protection. As the shields would seldom be used when in action with cavalry, I would not venture to impair the guns' mobility by making them permanently attached to the gun-carriages. I would rather see them carried on another carriage, and not brought up into the first line of wagons except when the battery is being used as Corps Artillery. Should the battery when thus employed have to be detached again to join the cavalry, it could leave the shields on the ground.¹

¹ Major Elles in his Silver Prize Medal of 1879 advocates a light steel shield

While on this subject I may add that I should like to see the tugs of the shaft horses no longer of the present pattern, but open, like the patent tugs of private harness, thus much facilitating hooking in; a great advantage in the case of a wheeler being shot or hooking in fresh horses under fire.

Now for armament. The one great point to settle is, whether it is necessary to have a lighter gun than the field artillery gun.

It is quite certain that the present 12-pr. is not too heavy for them, while, mounted as it is, it is certainly too heavy for us, weighing, without the two limber gunners, 39 cwt. 11 lbs.

The question is, could this weight be so decreased as to send it into the field with only some 35 cwt. (including everything behind the splinter-bar). I think it might. Perhaps the weight of the carriage might be slightly decreased.

Stores, amounting to 184 lbs., now carried on the gun-carriage, might be carried elsewhere. Lastly, if necessary one or both of the limber gunners might be mounted, as in the Prussian horse artillery.

In addition, the weight on the horses' backs might be sensibly decreased. Principal V. S. Fleming lately stated in a lecture at Aldershot that the weight carried by the near wheeler of a horse artillery gun was, with a 12-stone man, as much as 22 stone; and though I do not make it quite so much, yet undoubtedly it could be much decreased, thus affording sensible relief.

Whatever gun is finally settled on, its term of service is likely to be short; invention, with rival companies treading on each other's heels, follows speedily; quick-firing guns only await a smokeless powder, and there is a possibility that field howitzers may yet have a place on the field of battle.

PART III.

In a recent number of the Institution Journal there is a short paper entitled "Horse Artillery in Various Armies," by Captain Callwell, of the Intelligence Department, and as my name is linked to this communication in a footnote by Colonel Hale, and the whole communication is a critique on Appendix VII of my first lecture on "Horse Artillery," I can hardly be considered guilty of temerity in alluding to it. I propose first accepting, as we have a right to, that the figures given from such authority are correct, and examining the deductions drawn from them. Three tables are given: Table I, "Peace Establishment;" Table II, "War Establishment;" Table III, "Field Artillery."

As nations, unlike individuals, do not unfortunately fight like pugilists sometimes with gloves, sometimes without, it is, I think, useless to discuss the first, "peace" establishment; no nation is ever

$\frac{3}{16}$ inch thick, weighing only 7 lbs. 10 oz. per square foot. This gives a total weight of 167 lbs. with the gun, and 78 lbs. for the limber, a total for the spare cart to carry of 13 cwt. and 14 lb. This would be somewhat decreased by the weight of spades and shovels now strapped to the gun, for if shields be used, gun-pits will seldomer than ever be dug. Everything points to the infantry using the spade more, the gunner less.

likely to challenge us to a more or less friendly contest with our troops at present serving with the colours. War is far too serious a business to be conducted like that. It will be more than a matter of life and death of individuals, it will be a struggle for existence for the nation itself, and the amount of troops we have on our peace establishment is as much our own private affair as the amount of capital at the disposal of a private bank is of the proprietors. Even if our means and ways of mobilizing were the same, for instance, as other Continental Powers, it would be at the best a most fallacious test.

As regards war establishments, the number of guns, horse artillery, given as per 1,000 cavalry are as follows:—England, 2·3; England and India, 2·2; Germany, 3·3; Russia, 2·0; France, 3·4; Austria, 1·5.

It is difficult to see in the light of these figures how Captain Callwell can maintain that we are not weaker than our Continental neighbours in horse artillery. Germany here comes into the field not with three horse artillery guns to each of our two (she has, owing to her total strength, nearly six guns to our two), but with equal bodies of cavalry she can allow three guns where we allow two; in other words, with a cavalry Division of 3,000 sabres she could allow 9·9 guns where we should have only 6·6, while France could even allow a fraction more, viz., 10·2 to our 6·6. What is Captain Callwell's explanation of this table? He says:—

“In Table II, where the proportions of horse artillery guns to 1,000 cavalry are less than in Germany, the cavalry include yeomanry, which can only serve in the United Kingdom; excluding yeomanry, the war establishments of cavalry are very slightly larger than the peace establishments.” And elsewhere he says, “That no horse artillery exists in this country for service with the yeomanry is in accordance with the general practice abroad.” The yeomanry are either of use or they are not; if the latter, the sooner they are disbanded the better; if, however, their utility is admitted, and I for one claim them as a most valuable adjunct in war, both in case of home invasion, and in a serious struggle abroad as volunteers for the ranks of our far too few cavalry; then why, in the name of common sense, refuse them the advantage of artillery? But even admitting, for the sake of argument, that it is wise to deprive the yeomanry of horse artillery—and I will admit it on this one ground—then the peace figures alluded to above do not much help matters, only raising the percentage to 2·6 for England and India.

In the third table, entitled “Field Artillery,” India is unfortunately omitted. This robs the figures given of much of their value, as it is only by calculating India that we arrive at anything like a true state of affairs.

But does any one soberly suppose that if we go to war we can confine our operations to two army corps of the strength given? If we are to we shall indeed do badly. Supposing war between two Continental Powers, in which we get drawn in, no such improbable event, will either of the combatants be satisfied with us as an ally if we can coolly talk of supplementing their 18 or 19 army corps with only two more? Of adding one weak cavalry Division to their

9 or 10 strong ones? Are our Indian Princes' irregular cavalry to be unused altogether because we happen to have made no arrangements in peace for them? And above all, are the remaining cavalry, infantry, and field batteries, &c., in the United Kingdom, amounting to the difference between the two army corps and 80,000, not to be utilized in any way? But are Captain Callwell's figures correct?

In Table II he says: "Depôt horses and field batteries, &c., have been counted, since in the case of invasion, the depôts would certainly be used as service batteries." Is Captain Callwell aware that the actual needs of the horse artillery batteries in India this winter season amounted to upwards of 350 men? Many of the batteries needed over 40 men sent out to them.¹ Even supposing the horse artillery depôt had been strong enough to supply these needs, only recruits almost utterly ignorant of the higher needs of their duties could have been supplied, men some of whom had never yet galloped with a gun into action, none had ever seen a single shot fired. Had war been proclaimed, as far as India was concerned, none of these men would have been fit for their posts in English horse artillery. Thus out of the 11 batteries in India only 9 could have been sent on service. But alas! the depôt was too weak to supply this call, and on an average 10 men had to be taken from each of the service batteries to help the Indian batteries, thus seriously crippling some of those at home. Hence, instead of the depôt being of use as two fresh batteries, they were depleted of men, and yet were too weak to fulfil their own duty. Oh! but the reserve? The following table shows how far we can rely on this:—

Wanted to complete 5 batteries on the higher establishment up to war strength.....	85 men,	370 horses
Wanted to complete 4 batteries on lower establishment.....	212 ,,	401 ,,
Wanted for men supplied to India to complete their normal needs	93 ,,	
Under strength, say 6 per battery and 10 per cent. unfit for campaigning..	170 ,,	85 ,,
<hr/>		
Total required about	560 men,	856 horses

Against this we have, I suspect, between 600 and 700 men of the First Class Army Reserve, who would have to supply not only these 560 men but complete the batteries in India.

H.R.H. the Commander-in-Chief has himself said, "The artillery is a very delicate arm, and I certainly should not have confidence in a horse artilleryman after he has been away a year." In face of this may one not wonder how these 560 men are to be supplied?

But to return to our depôts. How about the horses? The depôt horses, fit as they are for their present work, are quite unfitted for

¹ 40 men going and another 40 coming considerably upsets a battery's efficiency.

active operations; probably not 10 per cent. would stand a campaign of seven days' duration.

But the guns, equipment, &c., are of use? Yes, the old 9-pr. M.L. may be if ammunition could be found for it in the Arsenal and wagons provided.

Thus, instead of placing our horse artillery guns at home as sixty-six in number, I aver that with so much to arrange and equip them for service, it is far truer to place them at forty-six as I did in my last year's paper.

But it is with Table III that Captain Callwell scores heaviest, bringing up his number of horse artillery guns per 1,000 cavalry to 7, and to 100 field-guns to 36. Now this table is a misleading one. It is headed "Field Artillery,"¹ which I am now told is a misprint for "Field Army," but having no notes or comments it was difficult to guess what it was. The number of horse artillery guns have risen 2 from the peace establishment, but the field guns have diminished from 200 to 132.

It is apparently a table showing the number of cavalry and horse artillery in the two army corps. I do not care to dispute this proportion.

I maintain that having sent off these two weak corps, you have left in the country, either against possible invasion or further operations on the Continent, a large force of infantry, cavalry, and field-guns with only six horse artillery guns. Instead of forming or trying to form new batteries then, I recommend by the comparison of former wars that it should be done now, even at the expense of other things.

Another point where I maintain we have shown short-sightedness in not maintaining a much larger force of horse artillery, is that we cannot but rely in our next European war largely on mercenaries, and these from the very nature of the case cannot be anything else than infantry and cavalry. Once war is proclaimed England will enter the market for soldiers. Cavalry will only be obtainable in the East. Our own native cavalry regiments will prove invaluable, but will not alone be able to supply the whole need for that arm, far from it. It is to the great native Princes that we shall turn for assistance, and will readily get it, but for artillery and horse artillery in particular they have none and never will have any to supply. Roughly speaking, 300,000 troops are thus at present in the pay of the native States of India, and two-thirds of this number are concentrated under the rules of ten Princes. Since the last Indian scare some attention has been paid to these troops as a line of defence, and every year is likely to see more and more heed and care paid to them by the English Raj. Their cavalry even now is probably by no means inferior to that of many of the Cossack sotnias; with English supervision it will quickly improve: are these troops then to be launched against the Cossack brigades, armed with a proper force of Cossack horse artillery? Or if they are to be combined with our own cavalry, thus more than doubling its numbers, are the auxiliary horse artillery to be left at

¹ Should have been Field Army.—ED.

its low strength of eleven batteries at peace establishment? The very fact that such irregular cavalry is likely to prove for all but reconnaissance work inferior to the mounted troops of European Powers, is an argument for giving them an extra large proportion of guns, rather than none at all.

In conclusion, I should like to say a few words about the cost of horse artillery, as many people look upon it as out of all proportion to its usefulness, others, though admitting its utility, would maintain it on as low a scale as possible for reason of this expense.

The principal items of expenditure over a field battery are as far as I can gather as follows, though it is possible I may have overlooked some items:—

	Higher establishment.	Lower establishment.
Difference in pay between a H.A. battery and a field battery, as set forth in the Army Estimates for the current year.....	£ 558	£ 924
Extra rations for men (viz., 151 men instead of 150, and 115 instead of 100) at 10l.....	10	150
Difference in money between the clothing of a H.A. battery and a field battery	99	84
Forage for 29 and 38 horses calculated at 29l. per horse per annum	841	1,102
Total annual charge	1,508	2,260
Add for depreciation of stores and extra horses : 29 horses minus 11 officers' horses at 3l. per annum, and 38 minus 11, <i>i.e.</i> , 18 and 27 horses	54 18	81 26
One seventh of the cost of the extra saddlery....		
Making a total per annum per battery of	1,580	2,367

But it must be observed that even this comparatively small extra cost is, in reality, less than it appears, for I have taken the lowest establishment of a field battery, when the amounts include respectively one man and fifteen men extra, hardly a fair item to enter into the comparison.

Was it for sake of this sum that four good old batteries were lately reduced? Surely it would be wise to raise them again, if I am right in the figures I have brought forward, and which merit a short explanation.

The first item includes the Officers' pay: thus, in it is included the 2s. 6d. a-day horse artillery pay the Major receives, or 45l. a-year; out of this he has to pay 1l. for income tax and 4l. 10s. for shoeing his horses. The remainder, 39l. odd, is supposed to provide for maintaining him in saddlery, stable necessaries, and horses. It is doubtful if the State would gain in relieving him of this. The main

part of the third item is made up by providing the dismounted men of the field battery with a mounted kit; the extra charge to the State of a rank and file horse artilleryman over that of a field battery mounted man is but 6s. 11*d.* annually. To speak of the expensive horse gunner is therefore a mistake, his dress actually costs 4s. 3*d.* less than that of a hussar, and 1s. 2*d.* less than a foot guardsman.

And yet it was not long since that we were told "the pomp of horse artillery, with its smartness and rapidity of pace on parade, cannot but cause regret at seeing its numbers reduced, but an undue proportion of it is an extravagance from every point of view that cannot reasonably be defended; and, if by the economy effected by the conversion of three horse artillery batteries into field batteries we can add to the fighting value of our Army as a military machine, we ought not to hesitate to do so."

I humbly maintain if we had hesitated longer we should never have taken the step.

The CHAIRMAN: I feel I shall express the wish of everyone present when I tender, in your name and in my name, our best thanks to Captain Robertson for the lecture so ably carried through, worked up with such care, and showing, as he has done before, such deep interest in his profession. We must all feel that this is a subject of vital importance to the efficiency of the Army, and therefore of the deepest interest to every intelligent man in the kingdom. I now beg to invite, according to custom, any gentlemen to make remarks in discussion upon this subject.

Major BARRINGTON FOOTE, R.A.: Rather from the point of question than of discussion I would ask to say a few words. There are several instances of rapidity of movement and the mobility of artillery generally quoted, and these usually come from India. The instances here are somewhat old, and I should like to quote an instance which took place about a year and a half ago, when Major George Turnbull's battery, out in India, covered in a certain march 47 miles in 10 hours and 10 minutes, which is even more rapid than many of the instances given here. I should be very glad to know whether there is any record of the mobility of artillery in England, or whether any record shows that mobility is recognized as one of the main points in the practical part of artillery training. Of course I am aware that a gallop of from 200 to 300 yards sometimes takes place at such places as Woolwich Common and elsewhere, but are there any records of more real training kept as to its being a *custom*, or any as to the tactical efficiency of batteries after long and rapid movement? These short manœuvres may cause enthusiasm amongst the spectators but they can scarcely be considered *la guerre*. The only other question I would ask for information is with reference to the reduction of horse artillery which took place some time ago, and it occurred to me it would be possible to meet the question of expense by maintaining the original number of batteries, but with reduced detachments. In my humble opinion, though I am perfectly sure I stand in a minority in what I am about to say, in time of peace it would be well perhaps to have considered this reduction of detachments. A horse artillery gunner need not be a brilliant horseman. The accomplishments of the riding school and the intricacies of the *manège* are, to my mind, quite beyond the necessity for a horse gunner.¹ The gunners of any field battery would in a short time be able to sit on

¹ The horse gunner works as one of the detachment in a battery, rarely is he required to act independently. The whole battery is one machine; never less than two guns with all that belongs to them would be alone. The cavalry soldier requires far more skill and higher class horsemanship. He constantly has to move and act independently, and, further, one of his chief duties is to be able to fight *on* his horse.—F. O. B. F.

a horse sufficiently well for all practical purposes. The horse artilleryman's horse is not a means for him to fight on, it is simply a means of locomotion, to fight when he gets off it to serve his gun, very much on the principle that horses or camels or carts are used for mobile infantry, simply that that arm may be carried rapidly to any required spot, their actual fighting power only coming into play when they arrive there.

Major DAVIDSON, R.A. : There was one thing in reading over this paper which struck me as being rather startling, and as Captain Robertson repeated it in his lecture I think it requires a little explanation. He says : " And though cavalry actions are proverbially soon over, yet, allowing an interval of 6 seconds per round, in less than $3\frac{1}{2}$ minutes the whole of your limber boxes will be empty." Does that allude to the whole of the battery limber boxes or does each gun fire a round a-piece in 6 seconds, because the lecturer also says with reference to a battery charged by cavalry, " When he is 400 yards from the guns they cease firing on the leading line, having been able during the 2 minutes 40 seconds of its advance to fire 18 rounds of shrapnel or 24 of common," that is, only 50 seconds less than $3\frac{1}{2}$ minutes. Surely it must allude to only 36 rounds for the whole battery, and therefore there would be 180 rounds still left. It is rather alarming if the whole of the limber boxes would be emptied in $3\frac{1}{2}$ minutes, and I cannot help thinking it must be a mistake. With regard to Major Barrington Foote's remarks about mounting the field artillery gunners without riding lessons, there are many Officers present more qualified to give an opinion on this subject than myself; but I think we have all seen gunners in positions where horsemanship was very requisite indeed; in fact, if the field artillery gunners started on the animal with a view to locomotion only, it would be quite possible that the animal and he might differ so much as to the direction the locomotion should be in, as to prevent any combined result.

Captain ROBERTSON : With respect to Major Barrington Foote's remark, I can only answer for myself, that I have taken the illustrations rather largely from India because I have not found them at home. I have carried out a long march myself in India but it did not meet with approval. I certainly would not like to try one at home. With regard with Major Davidson's remarks, what I meant was this, that in the case of cavalry advancing against artillery I was not supposing you are going to lose your head and fire as many rounds as hard as you can. I was simply stating what I thought was a fair rate of deliberate firing for preventing them approaching. In the other case I wanted to illustrate that if you did lose your head and your men lost their heads and there was no fire discipline, the very shortest amount of space that you could fire away the whole 36 rounds from your six guns, every gun firing away as hard as it could. I was not at all advocating such a thing; I very greatly deprecate it; but men do lose their heads, and I wished to point out if such things may occur it is all the more necessary to have your wagons fairly near.

The CHAIRMAN : I would ask permission to say a few words. I can only venture to address you as a cavalry soldier, which I have been all my life, but all my life I have had a strong opinion that horse artillery and cavalry should go hand-in-hand. One without the other is of but little value. I have tried in India, at the Curragh Camp, and elsewhere, whenever I have had the chance, to practise the exercises of these branches of the Service. Unfortunately for us, we have very few fields for this purpose, except the grand field of India, and the opportunities are very rare. Even the Long Valley at Aldershot is too small for a small brigade of artillery and cavalry. So it is, and we must not lose sight of it. It is serious to know, and many of us have seen it, that often good commanders in the field are at a loss what to do with their cavalry and horse artillery merely for want of practice. Looking to the future, we are all very earnest in the hope that the horse artillery will be re-established, and to the best of my small ability I have tried for the last two years in the House of Commons to support this idea. I have done this without reference at all to politics, and I merely mention it to show that I am a friend to the horse artillery through the cavalry interest, and I shall work for this end in the future as staunchly as I have worked in the past. I, to-day, came to England on purpose to be present, and to have the honour of presiding at this lecture, and this morning, with other things to do, I did take a few notes, and if you will permit

me I will explain them. I will not trespass on your time by expatiating on the splendid work the horse artillery has performed in the old days; we all know it, the country knows it well. In these days of what they call progress, but some of us think them changes, modern instances only are supposed to have effect. Fortunately, we have modern instances proclaimed conspicuously by that great commander who has been so highly spoken of to-day, and whose letters find such favour in all soldiers' hearts—Prince Kraft zu Hohenlohe. His writings have fortunately been translated into English, and I trust that the translation will be a text-book to every soldier in every rank in every branch of our profession. I will not go into the stories of long marches, of the splendid mobility and of the power of concentrating masses of artillery to pour fire into an enemy and of its grand effect; but I should like to refer to what he tells us so continuously of the splendid power of horse artillery in pushing to the front as compared with field artillery. We give all honour to field artillery, but it is impossible that they can do the same work as horse artillery. Their groundwork is of a different character. We have this recognized in Lord Wolseley's "Pocket Book," and I have written down his very words; he says: "It must be remembered that batteries of field artillery are not supposed to move faster than a walk as the gunners march on foot." Therefore, how is it possible that field artillery can get forward in the way that Prince Kraft has claimed for horse artillery? We all claim that batteries, whether in India or at home, do push to the front. I have always thought—"every man to his last"—our field artillery are splendid, our infantry are splendid, our cavalry, we believe, are splendid, but let us give credit to those who deserve it and who have the power of pushing forward. In parentheses I might say in answer to Major Barrington Foote's remark, that we did put it forward at the time of the first reduction of horse artillery, and we had excellent advice about it before we put it forward, with regard to making certain reductions in the horse artillery batteries, so as to save the battery cadres. That went before those who certainly seemed to be opponents to horse artillery and it was not accepted. We tried that two years ago, but it would not do at all. Our gallant lecturer speaks of the rôle of cavalry, covering the front, that is what we have been brought up to. We have seen it very conspicuously carried out in the late wars and we certainly shall have it in the future. I remember some very hot work we had in the House of Commons, perhaps not very strongly reported, as the reporters do not take as deep interest in the horse artillery as we wish they did; but I remember a member of the Irish Nationalist Party, as it is called, spoke to the point very much: he said he had served in the French Army during the war with Prussia, and on account of the horse artillery and cavalry the infantry never had a moment's rest, they were always hurried. And so it must be, and how can we possibly cover the front with cavalry unless we have horse artillery to help us? I need hardly touch on the question of proportion. Field-Marshal Lord Napier of Magdala in the House of Lords two years back entered into the question and held a strong position with regard to it. We have heard to-day no word of challenge as to the proportion of horse artillery to our Army. A certain paper came out a few weeks ago, and one or two who knew the work well and one or two who did not know it entered into it and they could not agree. I am sorry it is not challenged here to-day. I will only remark it occurs to me that there is much that is ignored. I will leave it to the future and I trust that this will be cleared up. I do not think anything can clear it up except an open discussion about it, and I do consider that our splendid cavalry in India, regiments of which I have had the honour of commanding in brigade with the native regiments in Her Majesty's Service (we always put two of them to one of our regiments), surely they are to be taken account of in the proportion of cavalry requiring horse artillery! If not, why keep them, with all their splendid services? I would say only a word or two in conclusion. I have touched much on the evidence of Officers in the highest position in foreign armies who have had opportunities of really going into great campaigns, but I would not for a moment ignore the evidence of those that we have served under and that we believe in. I have in my hand a packet of most interesting letters from Officers of the highest rank in the Service and from most distinguished Commanders, all deprecating deeply the reduction of horse artillery. I will not trouble you with more; but I do trust that we shall work with all our energy and with all our zeal, so that the

words of His Royal Highness the Commander-in-Chief shall be carried out when he said: "I consider that it should be restored to its former strength." He was speaking of the Royal Horse Artillery before Lord Randolph Churchill's Committee. These letters in my hand speak of the past—of the great work that the horse artillery has done, and how it has turned the tide of battle. These letters also clearly prophesy, by men who know no panic and who have every belief in the English Army; still they prophesy that if we go out to campaigns as our Army often has done before, we shall most certainly suffer unless we have our proper strength of horse artillery and means of supply. His Royal Highness has told us that he does not believe in reserve men after a year, and the Secretary of State for War, in answer to a question of mine lately, admitted that he had been obliged to send men from the 1st Army Corps to supply the common necessities of horse artillery for the year in India. Unless we have a proper supply always ready to go with a proper force in proportion to the Army (not in proportion to the cadres of cavalry regiments) of well trained artillerymen and horses (if you take from Leicestershire the finest horsemen and the finest horses, you will not train them to work in a horse artillery gun in time for any campaign), I say unless we have them beforehand these letters foretell clearly that we must expect to meet with a disaster that no strategy can retrieve, no sacrifice can save, and no courage can avert.

THE NAIL-LESS HORSE SHOE.

SPECIMENS of these shoes were shown at the meeting on the 3rd May, when the following were brought forward as prominent features of the shoe, viz. :—

1. No nails or screws in the hoof, and consequently no damage to the foot from carelessness or accident in shoeing.

2. No undue compression to any part of the foot or to the walls of the hoof.

3. The bite or grip of the attachment is firm and secure. It can be tightened or loosened at will, and readily accommodates itself to the exact tightness with which the shoe is required to be affixed.

4. It can be taken off at any moment and replaced in a few seconds.

5. It can be made to any size and form of foot.

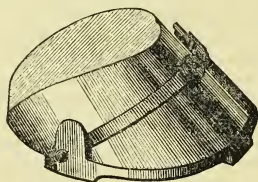
6. It will not interfere with the action of the horse.

7. It will act as a support to the hoof and will tend to prevent sandcracks.

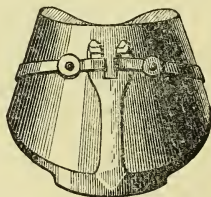
The shoes were inspected by many of the members, but there was no discussion as to the value or otherwise of the invention.

The shoes can be seen in use in London on application to the Secretary of the Adjustable Horse Shoe Company.

Side view.



Front view.



Hoofs shod with the nail-less horse shoe, showing the attachable parts in position. These may be attached or detached with the greatest ease, in a fraction of a minute, but, it was stated, cannot be removed accidentally.

Wednesday, May 8, 1889.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B.,
Vice-President, in the Chair.

LANCERS AND LANCES.

By Lieutenant-Colonel R. ELIAS, h.p., late East Lancashire Regiment.

FOR some time past there has been a very strong tendency in the German, French, and other Continental armies against encumbering cavalry men with cuirasses, and in favour of arming a large proportion of them with lances. The cuirasses have very few friends, but the lances have a great many, and I think I may say an increasing number.

A very few words need be said about cuirasses; in fact they only belong to the question as having shown a tendency to vanish in proportion as the lances have risen in favour, and in some cases old cuirassiers have become new lancers.

After the Crimean War, Russia had abolished her eight regiments of cuirassiers; she has, however, since re-established a Division of them—four regiments of the Guard.

After the war of 1866, Austria abolished her twelve regiments of cuirassiers, and transformed them into dragoons.

On the opinion of a Commission, presided over by General Lehn-dorff, and after some experiments made against cuirasses with fire-arms of small calibre, the Germans suppressed the cuirass in 1888, only last year. Thus, while the great military Powers of Europe are either totally or nearly abolishing cavalry equipped with cuirasses, an idea in another direction is leading to a very large and general increase in the number of their lancer regiments; and in France, where lances were altogether abolished shortly after the 1870 war, they are now trying them again.

Austria is now the only country possessing no lancers; but it is possible that there also they may shortly be recalled to life.

Germany has been the leader in the present movement in favour of lances; and not long ago—only last autumn—it was decided there to arm with that weapon some of the regiments just deprived of the cuirass, and this is supposed to be only the prelude to a more general measure.

In an article entitled “Cuirassiers et Lanciers,” in the *Revue Militaire de l'Étranger* (30th August, 1888), the author endeavours to

trace the ideas which have led to the reorganization of cavalry now being carried out in the German Army. He says:—

“A study of the growth of opinion which has led, and is still leading certain countries, particularly Germany, to put so much faith in the lance will not be devoid of interest.

“We shall no doubt find in the course of this research a confirmation of the fact that the traditions of the wars of the early part of this century, which the Germans have studied so thoroughly, have considerably influenced the important modifications they are now making in their military organization.

“The power of a weapon as a tactical instrument is not to be gauged only by its material properties; its power increases with the confidence it inspires in him who uses it, and the terror it strikes into those threatened by it. This is the moral value of the arm. A sentimental idea, perhaps, but nevertheless not without practical effect. Thus in the last war all the German cavalry was used indiscriminately, hussars and dragoons going out on reconnaissance duty as well as uhlans; yet it is only of these last we hear. Men created the legend of the uhlans.

“The perusal of the principal studies on cavalry, written in Germany, enables us to throw the light of a particularly interesting epoch upon the doctrines of this arm.

“The very decided opinion of our neighbours on its employment is not derived only from the work of the last few years; it is the result of long-continued labour, begun immediately after Sadowa and scarcely finished to-day.

“The Germans have believed in evolution, but never in any diminution, in the tactical power of cavalry. To-day, as much as ever, Frederick and Napoleon are the sources incessantly explored, and are *the most modern* masters recommended for the meditation of German cavalry.”

As small arms improve, their effect upon the moral condition of the infantry is enormously increased. Now-a-days infantry is much more exposed than formerly to the disintegrating effects of fire. The course of the combat alone entails great physical exertion, and this fact should be thrown into the balance in favour of the action of cavalry when we compare modern battles with those of former times.

Again, in admitting the continuous improvement in firearms, we must also credit them with a demoralizing effect, a power of wear and tear so great that certain portions of the fighting line, having been specially under their influence, will be found helplessly at the mercy of a daring cavalry capable of seizing the happy moment.

“If cavalry,” says the author of “The Cavalry Division in Battle,” “would only realize the enormous destruction of infantry in a fight with firearms, if it were acquainted with the ABC of infantry tactics, and especially if all our cavalry had been able to see the state in which discomfited infantry retires, it would never allow it to be said that the action of cavalry in battle is only accessory.”

This absolute conviction concerning the rôle of cavalry in battle will be found in nearly all the works of German military writers;

and let it not be thought that such doctrines are professed only by cavalry leaders; many infantry men are of the same opinion.

“ Against inferior or broken infantry, cavalry is *just as powerful now as ever*. Infantry which is not very solid loses its head just as easily as of old on the appearance of masses of cavalry swooping down on it at full speed; and if at that moment the men, instead of firing with cool judgment, let off their guns in the air and seek safety in flight, it is a matter of indifference whether their arms can carry 200 or 1,500 yards, or whether they can fire 4 or 10 cart-ridges in a minute.”

Having conceived a clear idea of the rôle of cavalry in future operations, and broadly defined its place in the great battle drama, the Germans have been at the pains to assign to it such an armament as will enable it rigorously to carry out their ideas; and they have not forgotten that their cavalry must be impressed by the conviction of its own thorough efficiency for the performance of its strategical and tactical duties.

The objects aimed at are—to possess a maximum of power both moral and material on the field of battle, and to be in a condition to act strategically in front of an army without the aid of infantry. For this two-fold reason Germany has increased the number of her lancer regiments, and provided all her cavalry with carbines.

Feeling, as they do, quite certain that the tactical value of cavalry is modified but not diminished, the Germans have not feared to adopt the ideas of Marshal Marmont although half a century old, and to agree with him that “for cavalry of *the line* the lance should be the chief, and the sabre an auxiliary weapon.”

It is not without reason that the Germans, who have such a special predilection for sabre cuts, are now developing the use of the lance; moreover, they were astonished to see the French, who with good reason hold “the point” in great esteem, abandoning the lance, which is *par excellence* the thrusting weapon.

Colonel Brix, of the German General Staff, in an interesting study on cavalry armament,¹ recognizes this tendency of Northern peoples to cut rather than to thrust, and goes so far as to regret that the German soldiers should possess a cutting weapon; and after narrowing the question down to a choice between the straight sword and the lance, he pronounces decidedly in favour of the lance.

A writer in the *Militär Wochenblatt* is of opinion that in a charge in line, or in a charge against batteries, the sabre cannot replace the lance. But his mind is evidently possessed by the success of Stuart, Lee, &c.; he remembers the sanguinary charges of the War of Secession, executed revolver in hand. Also, without unduly upholding a method of combat as dangerous to one's self as to the enemy, and above all very apt to counteract all the intensity of the shock, he considers the revolver to be the special weapon of individual combat; and he comes to the conclusion that the cavalryman should be armed with a carbine, a lance, a revolver, and in addition with a light sabre,

¹ “Thoughts on the Organization, Training, and Employment of Cavalry in Modern Warfare.”

which he says will make scarcely any appreciable difference in the weight. This is the armament of the Italian cavalry, who, I may mention, have the sword attached to the saddle—not to the rider.

Colonel Brix, having admitted the superiority of the lance, proceeds to certain more minute criticisms. Although everyone agrees that the duration of a cavalry combat against cavalry with the *arme blanche* is extremely short, and that after the shock or meeting there are very few “points” given, this Officer, considering the very special case of the *mêlée*, tries to fix the dimensions of which the lance should be so as to make it as effective as possible. “The long lance of 9 or 10 feet,” he says, “is unsuitable for the *mêlée*.” Perhaps the best length for a lance would be 2 metres, which should be held as near the butt as possible, so as to make it as long in reach as the ordinary lance held in the ordinary manner. In the *mêlée*, or in single combat, it would be held in the middle; it would then become a description of lance no longer than a sword, and as easily wielded, and which with its longer reach would be more effective. Colonel Brix thought that besides this lance the cavalryman should have a light sword.

The German cavalry is deeply impressed with the idea that the lance is the true weapon for the battlefield. The Russians have shown that they share this conviction by giving this arm to the front rank of their regiments of cuirassiers, uhlands, and hussars.

Opinions as to the numerical proportion of lances to other weapons, and as to their distribution in a squadron, regiment, or brigade, as the case may be, differ very considerably. The *Rivista Militare*, in an article on cavalry organization, sharply criticizes the distribution of different weapons in the same squadron. “There is no unity,” says the author, “when men with lances and others with guns ride in the same squadron; but with a regiment of lancers and a regiment armed with carbines in the same brigade, then the true unit is the brigade.”

Without enumerating historical examples, which would unduly extend the sphere of this study, we may nevertheless call to mind that the success of the charge made by the 3rd Regiment of Uhlands of the Prussian Guard on the Austrian uhlan regiment “*Empereur du Mexique*” at Czerwenahora (27th June, 1866) was attributed by many German Officers to the fact that the Germans had much longer lances than the Austrians.

The remarkable success gained by Captain Bechtoldsheim, charging at the head of three troops of Sicilian uhlands at Montecricol (Custoza), has been also by many military writers attributed to the lance.

I am here reminded of another feat of arms in which tradition has awarded victory to the lance—I mean the celebrated charge at the Pass of Somosierra, from which the Spaniards were driven in 1808 by Napoleon’s Polish Cavalry of the Guard charging up the causeway right into the jaws of a Spanish battery, posted in what was supposed to be an impregnable position. Well, unfortunately for tradition, these gallant horsemen were not armed with lances at all at the time, but with swords—and it was not until the following year 1809 that

they received lances, and became, what we now generally call them, "Polish Lancers." Still, we are free to maintain that if they had had lances at Somosierra, they would have performed just as well—perhaps, even a little better.

In Germany the necessity of giving to the cavalry the support of a firearm being considered undeniable, they have only to choose between two means, viz.: (1) associating with cavalry, bodies of infantry, mounted or conveyed on wheels; and (2) providing the cavalry with firearms. They have chosen without hesitation the latter method; hence abolition of the cuirasses. They also find it advisable to provide that half of the cavalry which is the heaviest and most powerful in the shock, with the lance, the tactical arm *par excellence*.

Germany then will soon possess only two descriptions of cavalry, viz., cavalry of the line, powerfully mounted, and armed for the charge in line, *i.e.*, the cuirassiers and uhlans; and the light cavalry, more alert for fighting on foot and better equipped for individual combat, *i.e.*, the dragoons and hussars. Carbineers, light horse, &c., as far as concerns organization, will be no more than historical varieties of the above two categories.

There is nothing new in the application of similar ideas to cavalry organization; their origin is to be found in the wars of Napoleon.

In a letter to General Clarke, Minister of War (12th August, 1811), Napoleon writes as follows on this double question of cuirassiers and lancers: "It is admitted that cavalry in cuirasses cannot easily use a carbine; but it is nevertheless very absurd for three or four thousand brave men to be surprised in their cantonments or stopped on their march by a couple of companies of light infantry. . . . I desire that you form a council of cavalry Officers, and come to some conclusion on the subject. I cannot accustom myself to see 3,000 picked troops made prisoners perhaps by the light troops of some partizan leader in an insurrection or a surprise; or, on a march, pulled up by a few wretched pot-shots behind a stream or a house; this is absurd; my intention is to give every man a firearm.

"War is made up of unexpected events; and he has no notion of it who supposes that 15,000 heavy cavalrymen can always make sure of some escort or cover.

"As to the lancers, see if it is possible to give them a carbine in addition to the lance.

". . . The Cossacks have lances, but they have carbines, and even long muskets, with which they shoot at very long ranges."

That is the programme now being partly carried out by the Germans in their cavalry reorganization.

Without going back (remarks the *R. M.*) to the days of chivalry and feudal times we may be permitted to ask: Is not the lance the very weapon most suitable for the heavy cavalry, acting, as they do, more than any other arm by shock?

The Germans had up till lately twenty-five regiments of uhlans, *i.e.*, armed with lances. When the present organization is completed, these regiments will number thirty-five; or even thirty-nine, if the measure

be applied to the four regiments of Saxon and Bavarian heavy cavalry. . . .

Germany has apparently, says this French Officer, once again turned for inspiration to our military past.

II.

The following is translated from the *Militär Wochenblatt* of the 16th January, 1889.

The writer, after remarking that the recent manœuvres at Müncheberg (autumn of 1888) brought out many points of interest with regard to cavalry, continues:—

“I have only to mention the word ‘lance.’ There can be no doubt that the ideal cavalryman for the fight would be a perfectly trained, well-mounted, and skilful horseman, armed with lance and carbine. We shall see after a fair trial now being made in certain regiments furnished by way of experiment with lances whether this ideal is attainable. . . . That the lance is a disadvantage when cavalry are fighting on foot, detracting from the free use of the carbine, is, I think, undeniable; but the most important consideration appears to be that we should possess the lightest possibly equipped horseman, able to slip through or over anything, for long distance reconnaissance rides and operations in difficult country. One can hardly imagine a ‘Zieten out of the bush’¹ armed with a lance—practice, however, accomplishes much, and whoever has served with both uhlans and light regiments can say whether the former were as ‘handy fellows’ as the latter. Unquestionably a patrol of uhlans can move about a country patrolled by the enemy with more confidence than horsemen armed only with sabres, which is another advantage as regards reconnoitring duty. A certain feeling of superiority and independence is doubtless pretty general among uhlans. There are so many points for and against each side, and they are so evenly balanced, that it is impossible to exhaust them. . . .

“I do not think the lance question will be settled during the year 1889, as our custom is to prove things thoroughly.”

III.

In Lieut.-Colonel Denison’s “Modern Cavalry” and “History of Cavalry” there are many examples of cavalry fights in America (War of Secession) and elsewhere, also many opinions on cavalry armament. He quotes, like many others, Montecuculi’s well-known saying that “the lance is the queen of weapons,” and appears to agree with it to a great extent. “The lance is a most efficient weapon,” he writes, “when used by a thoroughly trained man; but in the hands of new levies it is perfectly worthless. In carefully disciplined cavalry of the line intended for charging alone, the lance has a terrible moral effect upon the enemy. . . . When the fight, however, degenerates into the *mêlée* then the lance is awkward and cumbersome.”

¹ *I.e.*, a dash of cavalry from behind covert, after the manner of Zieten.

Colonel Denison frequently points to the extraordinarily small amount of damage done on either side with any *arme blanche* compared especially with the deadly effect of the revolver, which ranks very high in his opinion as a cavalry weapon, against cavalry, or against anything except long-range firearms.

Quoting General Stephen D. Lee (War of Secession) he says: "My experience was that the cavalryman was timid with his sabre in fighting against the revolver, and for the least excuse will drop the sabre for the revolver. . . . I don't see well how the sword can be dispensed with permanently, as some such weapon is required in case ammunition should be exhausted; but if any weapon is to be dispensed with, I should say the sabre in preference to the rifle or revolver. In every instance under my observation, the revolver replaced the sabre with the *morale*, with the troops, and against the enemy. . . . Lancers should always have swords as well as lances, as they never dismount to fight, and the swords are therefore not in the way."

Colonel Denison gives his opinion that heavy cavalry should be armed with lance, sabre, and revolver; one-half of them, or a somewhat similar proportion, being armed with sabres and revolvers alone, and the remainder with lances in addition. He also calls attention to that phase of the Franco-German War when, early in the Siege of Paris, the French had organized the "Francs-tireurs." "When these Francs-tireurs became numerous, the uhlands could no longer move freely to great distances, but were almost always accompanied by battalions of infantry. . . . The experience of the Franco-German War is very remarkable on this point, for the brilliant exploits of the Prussian cavalry in the beginning of the campaign would lead one to expect that they would not have been much embarrassed by the opposition of such undisciplined and irregular troops." This, it will be noticed, is exactly what Napoleon I wrote about in his letter to General Clarke quoted above. In the War in America, the Southern horse were somewhat surprised at meeting with the same difficulty.

IV.

The late Major-General Sir Charles Macgregor¹ writes: "With regard to the armament of native cavalry, I consider the sword to be the queen of weapons for the light horseman" And he proceeds to advocate, in addition, a carbine, or a double-barrelled pistol, for each man. He then says: "I am of opinion that the lance in the hands of a master in its use is the most deadly of all weapons; but I know from experience it is so difficult to learn the use of, that I would not venture to recommend its general adoption in any regiment of cavalry. On the other hand, I would not wholly abolish it, for in Indian warfare there are times when a few skilful lancers can be of the greatest service. The only drawback to having an unfixed number of lances in a regiment would be their appearance

¹ "Life and Opinions of Major-General Sir C. MacGregor," vol. i, p. 209.

on parade; but, while I think that appearance should on all occasions be sacrificed to utility, I think that a little management might so place these lances as not to offend the eye of the most particular."

V.

In France, by a recent order, the *front rank* of ten (or twelve) regiments of dragoons, forming part of the "independent cavalry," have been experimentally armed with lances. On this, a French military publication (*Revue du Cercle Militaire*) remarks that it is a measure which can hardly astonish cavalry Officers, but, on the contrary, must appear to them very tardy. We naturally ask what were the circumstances which led to the disappearance of the lance in the French Army. It appears that after the War of 1870-71, when it became necessary to reorganize the military forces, the first step taken relative to cavalry was to abolish the lance; and, by a Ministerial decision in August, 1871, nine regiments of lancers were dispersed, and incorporated into other branches of cavalry—hussars, chasseurs, dragoons. The principal cause of the abolition of lances is to be attributed to certain not very well-reasoned ideas springing from the moral depression caused by the disasters of 1870-71. In the state of mind thus induced, the French seem to have exaggerated the effect of modern arms of precision on the *rôle* of cavalry, and to have overlooked the fact that its shortcomings in the late campaign were greatly, if not chiefly, due to want of skill in the higher ranks, to a certain unreadiness for war which pervaded the whole army, and to a too faithful adherence to antiquated regulations and formations. Even before the war was over, distrust in the lance, and in the *arme blanche* generally, had become pretty widespread. A French Colonel of lancers is reported to have requested the Ministry to take away his lances, and to give him chassépôts instead, adding that armed as he was, he could not efficiently reconnoitre, and "enlighten" (*éclairer*) the army. But the authorities, in reply, pointed to the Prussian uhlans as an example of men armed in the same manner, and having become specially notable for reconnaissance services; and it is a very curious instance of the inconsequence of public opinion that, just at the time when the French lancers were being abolished, the renown of the legendary Prussian uhlán had become exaggerated almost to the point of mythology. The writer in the *Cercle Militaire*, expressing no doubt the general opinion of French cavalry Officers, cordially welcomes the return of the lance; he enumerates its many advantages over other cavalry weapons—its great moral effect, its length of reach, not only offensively, but also in keeping off assailants in front, on either hand, and even from behind, not forgetting the great effect of a dexterous and timely blow with the butt-end—and quotes Marmont and others in support of his opinions.

We mentioned above that the newly-armed French regiments are to have lances in the front rank only. Marmont, in his "Esprit des Institutions Militaires," has the same idea. "The cavalry of the line," he says, "should have lances and straight swords; the front rank to

charge with the lance, the second rank with the sabre—once the shock has taken effect and the ranks become mixed the swords of the second rank will perform their office.” The Russians have the same arrangement, maintaining that after the first contact of two bodies of cavalry charging, the lance, even for the front rank, becomes almost useless, and still more so for the rear rank. So that the rear rank must have swords with which they can back up their front rank men. The principle is the lance for the shock and the sabre for the *mêlée*.

VI.

As nearly all the writers whose opinions I have seen on this question are in favour of lances, it is only fair to notice one or two who are less favourable. First, a French Officer in the *Revue Militaire de l'Étranger* (1st March, 1889) breathes forth a note of warning tipped with raillery. He begins by assuming that the new French lancers are to be armed with the lance alone, and calls the whole movement a mere sentiment and a tendency to copy “our neighbours” (*i.e.*, the Germans); he calls the lance a weapon of antiquity and of the middle ages, and the present re-institution of it in France an ill-starred experiment (*essai malencontreux*). This would be all very well if it were intended that the lancers should have nothing but their lances to depend upon, which will assuredly not be the case. I have not yet heard what the whole armament of the French lancer is to be, but certainly he will not be armed with the lance alone, probably with a long-range carbine in addition. The reasoning of this author is logical in appearance, but it does not embrace the whole question; it is all based on the idea that a lance is better than a sword, because it reaches further; and a long-range firearm better than either, because it reaches further still. But, as we have seen, there are occasions when swords and lances can be used with very great advantage.

There is also the late Captain Nolan, 15th Hussars, who wrote a book on cavalry, and in it does not express any special enthusiasm for the lance—rather the reverse. He admits that on certain occasions it is useful: for instance, against young and inexperienced troops, who are frightened at its formidable appearance, and also at the first onset when there is plenty of pace on, for with speed you can drive a lance through anything; but without it, it is very difficult to make it penetrate. He reminds us that when the 16th Lancers broke into the Sikh squares at Aliwal many of the lancers were laid low by the Sikh swordsmen in the *mêlée* which ensued, because they were then unable to use their lances. He also states that the pennons are seen a long way off, that they attract the fire of the artillery; and sometimes frighten the adversary's horse, making him shy and get out of reach just as our brave lancer is making his point. But any objection to pennons can surely be easily remedied—they can be taken off. Captain Nolan thought the lance a better weapon than the ordinary European cavalry sword; but not so good as the scimitar of a Turk, the sword of a Mahratta, Sikh, or Circassian horsemen, or any sword with an edge to it.

VII.

To sum up, three chief points have to be taken into consideration: (1) cavalry against cavalry in line, or large bodies in battle; (2) cavalry acting independently on reconnaissance duty, &c.; and (3) cavalry against infantry and gun detachments (excluding, however, fresh infantry armed with the best modern rifles, as being invulnerable by and inaccessible to cavalry).

As to (1), cavalry in battle. In the Franco-German War the different kinds of cavalry on both sides were frequently employed together and indiscriminately, cuirassiers, lancers, hussars, chasseurs, all mixed together. This was the case on *the* great cavalry day, the 16th August, at Vionville and Mars-la-Tour; and although, on account of many disturbing influences, little light is thrown on the use of any particular weapon in these encounters, we may, I think, assume that for such charges, lancers should have a sword and perhaps a revolver. In the American War of Secession the revolver did much greater execution than either lance or sword. The revolver, however, as at present constituted, is rather a tricky weapon, occasionally dangerous to one's self and friends. Time, however, will probably remedy this drawback. (2.) Cavalry employed independently, *i.e.*, the uhlans, found lances admirable weapons in 1870-71; but they must have a long-range firearm in addition, as we have seen, or be accompanied by comrades who have. (3.) Against more or less shaken infantry, gun detachments, &c., all admit that lances are very effective, but even here the addition of a sword or revolver would be advisable. It will thus probably be agreed that lancers should, besides their lances, have revolvers or swords, or both (the sword perhaps attached to the saddle), also a long-range firearm; and a choice must be made between providing each man with three or four weapons, and fixing a unit, be it squadron, regiment, or brigade, composed of men not all armed alike, but furnishing all the weapons in the aggregate. The plan of having lances in the front rank only appears to me well worthy of consideration.

For us who so frequently have to fight with people such as Afghans, Arabs, and other Asiatic warriors, very brave, but always badly off for firearms, and often proving specially dangerous by unexpectedly delivering sword cuts when lying on the ground, lances are of the very greatest service, as a cavalry man with a sword cannot reach them.

VIII.

With regard to the weapon itself, lances have been made of many different patterns, sizes, and materials. Formerly the shafts were usually made of ash, but bamboo is now the favourite, what in India is called male bamboo, *i.e.*, the solid and heavier kind. In India bamboos are grown especially for lance shafts. The head is fixed on with shellac. Unless they are very well made, the part where the head is joined on to the shaft is a weak point in lances. It is said that this weakness was one of the reasons for the abolition of the

lance in France and Austria. In order to escape the necessity of this joint, some lances have been made entirely of metal; one pattern had a screw in the middle so that it could be taken in two. But the metal lances were heavy, and such experiments do not appear as yet to have met with much success. The Germans, French, and Russians are all favourable to the bamboo shaft. The French, I believe, expect to get theirs from Tonquin. A very well-known sword and lance manufacturer here in London informs me that he has had enquiries addressed to him by Germans and by Russians about bamboo shafts for their lances; but at present it appears that the supply of male bamboos is inadequate even for our own Army.

I hope I should not be thought unpractical if, in conclusion, I were to invite attention to that splendid charge of lancers in the "Lay of the Last Minstrel," where the Lord of Branksome, with 500 riders, goes out to meet Gilbert the Galliard at the head of the Beattison clan, when he wound his horn

"So loud and clear
In the grey mountain mist there did lances appear.

Then had you seen a gallant shock,
When saddles were emptied and lances broke!
For each scornful word the Galliard had said
A Beattison on the field was laid.
His own good sword the chieftain drew,
And he bore the Galliard through and through."

The CHAIRMAN: I hope there are some, I might say many here, who will join in the discussion on this very interesting lecture, which gives large scope for consideration. I will particularly request the opinions, which will be very valuable, of the Indian Officers who are here present.

Colonel the Hon. H. LEGGE, 9th Lancers: Sir Beauchamp Walker and gentlemen, I feel that as I have the honour to command a lancer regiment I may be permitted to say something upon this subject which has been so ably brought forward by the lecturer to-day. I think that the thanks of all lancer Officers are due to an Officer of another branch of the Service for bringing the matter forward, and reading the very valuable paper which we have just heard. The evidence that he has brought forward in favour of the lance is, to my mind, overwhelming. The authorities that he has quoted are very numerous, and the views opposed to it are in such a small minority that I think there can be no doubt at all of the utility of the lance as a weapon. It is interesting to know that every European army, except the Austrian, at present has lancer regiments, and that the Germans are increasing the number of their lancers. Colonel Elias has told us that the reason the Germans are increasing the number of their lancers is, in consequence of the lessons they have derived from the wars at the beginning of this century, and it was these very wars, at the beginning of this century, that first induced the English authorities to arm some of our cavalry with lances. In the historical record of the 9th Lancers I find it stated, with reference to the year 1816, that the experience acquired during the war of the value and importance of cavalry equipped with the lance, which weapon had been laid aside by the British horse for 200 years, led to the introduction of that weapon in that year. On the 19th September the authority of the Prince Regent was granted to the 9th, 12th, 16th, and 23rd Regiments of Light Dragoons to be armed and equipped with lances and, in consequence of that arrangement, to discontinue the carbine. It seems rather curious that the carbine should be discontinued, but that apparently was considered a necessary consequence of arming regiments with lances. It was reintroduced, as far as my regiment is concerned, in 1878, and was

found very useful shortly afterwards. The chief questions that appear to me to arise for consideration are the number of weapons the lancer should carry, and the proportion of lancers you should have in your cavalry. We have heard suggestions for arming lancers with the lance, carbine, sword, and revolver. I must say that I think that is far too many weapons. There is a great tendency to make a man Jack of all trades and master of none. I am fully confident myself that with the lance and carbine lancers can do their work just as well, do just as great execution, and be just as formidable to the foe as regiments armed with sword and carbine. I do not think, therefore, there is any necessity for the lancer to carry a sword at all. I have not only in my small experience never seen a man armed with a lance require to use the sword, but I have never been able to find anybody who could tell me that they had ever seen it done. Therefore, I cannot think the sword is any use to the lancer at all. When we have to carry swords we place them on the saddle, but I should like to see the sword taken away altogether. I think the carbine is necessary, and if it is thought necessary to give the lancer a third weapon, it seems to me that the revolver would be likely to do as much harm to friends as to foes in a *mêlée*. I think, however, that a double-barrelled pistol would be of some use, because a man with only two barrels to his weapon would be careful how to use it, and he would not fire it all round as he might do a revolver. I believe myself that, with the lance and carbine, the lancer is equipped as he ought to be. The other question on which I would like to say a few words is that of the proportion of lances. Some armies, as we hear, have lances in the front rank and swords in the rear, the idea being that the lance is the weapon for the shock, and the sword the weapon for the *mêlée*. If cavalry service consisted merely of shock and *mêlée* and the two ranks could be kept intact that might be very good, but you must bear in mind that casualties will occur in the front rank which are filled up by the rear rank; that during a charge, in order that horses may gallop, they must open out to a certain extent, and if they open out too much the gaps thus caused may be filled up by the rear rank. There is also another point which I think is generally admitted, that is that though in practising the charge you may keep your rear rank together at its proper distance from the front rank, yet when it comes to actual combat you will find the boldest men and the fastest horses will get to the front and the less bold men and slower horses will drop back and form the rear rank. Therefore, I think it is far better to arm the whole regiment with the lance. With regard to the question of the proportion of lancers to the others, I think one lancer regiment to every cavalry brigade would be a very useful proportion and one that I should strongly recommend.

Colonel JOHN FRYER, C.B., late Commanding 6th Carabineers: I do not propose to enter into the details of the arming of cavalry, as that would embrace firearms, but to say one or two words on the special and interesting subject which has been brought before us to-day so opportunely by my friend Colonel Elias, namely, on "Lancers and Lances," and to compare the two weapons of the same class for hand-to-hand encounter. It is a generally accepted fact among all those who have practised the use of the sword, that the most telling and deadly stroke with that weapon is the point; that being so, the lance having a longer reach has the advantage on that score as well as in steadiness and force of thrust. Then the lance has a double advantage also in its guard, having a bar above and below the grip to the cut of an adversary. That is, holding the lance in the middle you have a double guard. I take it the meaning of the lecturer was to speak of the value of the lance in contradistinction to the sword, both being of the same genus. Of course you cannot compare long-distance firearms with hand-to-hand weapons, therefore we will compare the lance with the sword. I will give three comparisons. First, in single combat, the best man, either with lance or sword, would probably win the encounter. Secondly, with two men equally brilliant in the use of their weapons I think the lance would have the best of the bout. Third, and I think by no means a bad test, is the encounter between two duellers which I have often witnessed, and you will find the lancer generally give the swordsman the first "poke," the sword being a practically harmless weapon in such hands. That is, taking men together who are not brilliant either as swordsmen or lancers, I think you will find the lancers will have the best of it. I only heard the other day when I was in Hanover of an encounter there, and a bet made by an Officer of the 9th Uhlans, who singly with a lance challenged any four of his

brother Officers of hussars with swords, all four together. The challenge was accepted. Well, gentlemen, I will tell you what the result was : he had two of them out of the saddle more quickly than I could say it, he then encountered the third and ran him through, and as to the fourth, who was coming round in his rear, he turned round and after a bout of about half a minute he had run him through also. I think you may quite say that the Germans have implicit faith in the lance, and this little affair having taken place I think it only strengthened the opinion, especially in that one particular regiment. I see our worthy lecturer has quoted Captain Nolan with regard to the battle of Aliwal. He says: "When the 16th Lancers broke into the Sikh squares at Aliwal many of the lancers were laid low by the Sikh swordsmen in the *mêlée* which ensued because they were then unable to use their lances." About ten days ago I was in conversation with a very distinguished General in our Service who was a quiet witness, lying on his stomach, of that great encounter, and he told me that the 16th, after the first charge, got into the square, and for a minute or two he said there was hardly any sound whatever, but at the end of that minute or two the Sikhs were seen running pell mell in every direction with the 16th after them. I think that gives you an idea that as against the sword, the cutting weapon, the lance is the better weapon of the two. I have not had the honour of serving in a lancer regiment, as my friend Colonel Legge has. I served for many years with a regiment armed with the sword and carbine, but I have the very highest opinion of the lance. I believe the lance to be a magnificent weapon, and I should be very pleased to see our equipment very largely increased in that particular weapon. I think we are greatly indebted to Colonel Elias, who belongs to another branch of the Service, for bringing forward this most interesting discussion.

Lieutenant-Colonel DAVISON, 16th Lancers : At the battle of Aliwal, the 16th charged in succession of squadrons and wings. Altogether there were 57 men and 2 Officers killed and 66 horses, but hardly any of those horses were killed by sabres, they were nearly all shot. Two Officers were shot, and there were six other Officers wounded, five with bullets. With regard to the Sikhs, certainly a few men laid down their muskets and took up their swords to kill the wounded men, but very few men were killed unless they had been wounded first. Then in the Soudan, England had to arm her cavalry with spears taken from the Arabs. The 10th and 19th Hussars after the battle of Teb found their horses would not go near the bush where the Arabs were, and they could not reach them with their swords, therefore they had to get spears from the dead Arabs and arm themselves with them. I think that is a very strong test of the value of lances.

The CHAIRMAN : I hope the discussion is not going to end here. I have a list of those present, and I see amongst them more than one who can give us valuable war experience.

Colonel BOYLE, 11th Bengal Cavalry : I only rise, Sir, in order that the discussion may be continued. I see people here much more competent to join in it than myself. I did not come with any intention or idea of taking part in the discussion. I have not had the advantage of seeing this most able paper previously ; and I therefore feel at a disadvantage. But two or three ideas have occurred to me in the course of listening to the paper, and I venture to say one or two words about them. The lecturer says that there is a weak point in the lance where the head joins the shaft. "The head is fixed on with shellac. Unless they are very well made, the part where the head is joined on to the shaft is a weak point in lances." No doubt, "unless they are very well made ;" but they can perfectly well be so fitted as to leave the join by no means the weakest part of the lance, if the sockets are properly heated, and the top of the bamboo is not too much pared away. It must be cut to take off the skin, and if put into a properly heated socket it can be fitted with shellac almost stronger than any other part of the lance. I am sorry to say I am on the unpopular side with regard to the much vexed and discussed question—whether lancers should have a sword. I am disposed to think that the lancer ought to carry a sword. Of course the question very much depends upon the cognate question whether the lancer armed with the carbine should carry his weapon on his person or not. If he always carries his carbine slung across his back, in action or on service, or anywhere near the enemy, the question becomes entirely different to what it is if the carbine

is carried in a bucket. A man may be unhorsed ; his lance probably flies from his hand ; and if he has no sword, and his carbine is not on his back, he is left entirely defenceless. Then there are other duties ; men are not always on horseback, they have at times to take charge of prisoners, and there are other miscellaneous duties constantly occurring for which a man armed only with a lance is not properly armed, the lance being an admirable weapon on horseback, but not much use when the man is on foot. Even in action itself it may be very advisable for a man to have a sword. Upon one occasion a squadron of the regiment I had the honour of commanding, in number some ninety lances, was engaged, and at the close of the action twenty-three of the lances were found on examination next day to be un-serviceable owing to their being cut by the swords of the enemy near the head, probably, in many cases, immediately after or just before the lance actually entered the body of the men who cut them. At any rate, some of the lances were so badly wounded that any stress upon them would have broken off the head, and the men would have been defenceless or unarmed if they had not had swords to fall back upon. So that that I think is also very much in favour of the sword. It depends, as I have said, in great measure on whether the carbine is carried on the body or not—for which practice I am a strong advocate. With regard to the point made by Colonel Fryer as to the lance being probably a more efficient weapon in the hand of an inexperienced soldier than the sword, I may point out that the lecturer cited an American opinion, which appears to be one of an important kind, to the effect that the lance is almost useless for untrained men. No doubt the sword is much in the same condition for *absolutely* untrained men. With regard to the German trial mentioned by the same speaker, I have no doubt that it occurred in a lancer regiment. I have always observed that it makes a great difference in the results of such trials whether the combatants belong to a regiment armed with lances or to a regiment armed with swords. As to the lance being better than a cutting weapon in India and in the East generally, besides the matter on which I remarked just now of the heads of the lances being actually liable to be cut off, or at any rate very severely wounded, by the sharp swords of Eastern warriors, we must remember the very well-known fact as to the sharpness of the swords carried by the Eastern races as compared with ours. No one has put this point better than Captain Nolan did in the book quoted by the lecturer. He described the fearful cuts made by the curved sabres of Indian horsemen as compared with those made by the swords of British soldiers ; the former being carefully sheathed in wooden scabbards which are so arranged that the edge really never touches the scabbard at all, and are always very carefully drawn and returned. I need say nothing at all before this audience about the very well-known destruction between that method of keeping and carrying swords and that which is in use in our own Service.

Lieutenant-General Sir JOHN WATSON, V.C. : Lest the discussion should drop, gentlemen, two or three of my friends here have asked me to speak. I was a lancer once, I am only a fossil one now, but, perhaps, without entering into any discussion, I might refer you to the old proverb that a pennyworth of practice is worth a pound of argument. Thirty years ago I used to ride, and rode for many months, alongside the regiment which Colonel Legge now commands—the 9th Lancers. They were armed then with things more like boathooks than lances—heavy ash poles—but the execution they did with them was something wonderful. Sir Hope Grant always got hold of a bamboo lance if he could, and it was owing to his influence, I think, that bamboo lances were introduced into the Army, and we all have bamboo lances now. With regard to my practice, I will tell you what I did when I had a regiment to arm and was not interfered with by orders from Headquarters : I armed the men with a bamboo lance, a light sword and pistol. I had two-thirds of my squadron lancers, and the other third had carbines instead of lances. I did not place my carbines in the rear rank, but I placed them upon either flank, because I found in manœuvring (as I always did in squadron column of fours) I had my carbines in front when I was advancing and my carbines in the rear when I was retiring, so that I could, without disarranging the formation of the rest of my squadron, send them to the front or drop them to the rear without interfering with the main body of the lancers. What I did myself, although it is many years ago, I still think is about the best form of armament. From my own experi-

ence of lancers, and of what the 9th Lancers used to do in the Mutiny Campaign, I still hold that the lance is the queen of weapons, and I hope it will always hold that place. One main difficulty in having a large body of lancers in our Army is not only the difficulty of training the men but of training the horse, because a lancer to be a good lancer must not only know how to use the lance, but he must have his horse most thoroughly and perfectly in hand, otherwise he is useless. Therefore, I do not know whether it is any use increasing the number of lancers, unless we have a greater opportunity of training both men and horses to the use of it.

Colonel ELIAS: I think there is very little left for me to say. Colonel Legge spoke to you about the lancers being encumbered with so many weapons. I brought forward different propositions which did advocate a great many, but I must say, if I may give an opinion as an infantry man, I agree with Colonel Legge. I do not see how a man can conveniently ride and mount and dismount when he has three or four weapons, and I should think a lance and a carbine ought to carry him very far. Of course there is the occasion that Colonel Boyle noticed—against the sharp Indian swords; and if men get the heads of their lances cut off they would be in a rather unfortunate position, perhaps, if they had not a sword or revolver to fall back upon. At any rate, I suppose we have not to decide it exactly now: we must leave it an open question at present.¹ I dare say what I read did not give the full facts of the case. In the account I read it certainly did say that the Sikhs had wounded a good many lancers with swords, but it is possible they may only have wounded a few, and of course it is very well known that even if they did, the lancers got very much the best of it. My allusion was only meant to show that the lance was an awkward weapon when the man who uses it is jammed up in a crowd. Then Colonel Boyle spoke of joining on the heads of lances to the shafts. I do not profess to know much about the manufacture of lances, but I was told that that was the weak point; but I believe if the iron is carried a long way down the shaft on each side it is all right. I have no doubt, as General Watson says, that it is necessary to train the horse well, and even for swordsmanship I suppose you must have a well-trained horse too. I am sure General Watson's mixture of carbines and swords was a most excellent one. The distribution of different weapons is a question that I think might be decided in more ways than one. I mean to say you might have, as I said before, the lance and the carbine in the same squadron or regiment or brigade, and on different occasions it might be advisable to distribute them differently. I suppose if there is only one regiment you must have the two arms in the same regiment. Perhaps, in a large body of cavalry, it might be better to have each regiment armed uniformly throughout, but various arms in the brigade; certainly, if I were a cavalry commander, I should like to be able to decide that for myself, as General Watson did.

The CHAIRMAN: It only remains for me to sum up the lecture, which has proved as interesting as I hoped it would be when I was asked to take the Chair. I must remind Colonel Elias that he somehow missed a cavalry authority for whom I have the highest opinion amongst all those who have ever written upon cavalry, and that is the author of a book which never leaves my travelling bag, De Brack, who has written incomparably, in my opinion, the best book on cavalry that ever was published. I naturally, when the lecture was sent to me three days ago, pulled De Brack out, and looked at the chapter in which he particularly speaks of the lance, and his words are, in his short terse French, "The lance is the *arme blanche* of which the moral effect is the most powerful, and of which the blow is the most murderous." He then, as he always does, in the manner in which the whole book is written in the shape of question and answer, enters into how the lance is to be used. He particularly points to one fact which to me appears the only weak point in the lance, and that is that it sometimes happens that in giving a powerful blow with it the lance is left with the point in the body, and the lancer is unable to extricate his weapon. Unless he has a sword, he would therefore be powerless in a *mêlée*. The only time that I ever was mixed up with a lance was when we ran away from the Chinese. I had an orderly with me from one of the Native Indian

¹ I am very glad to hear Colonel Fryer so manfully upholding the lance. Both he and Colonel Davison spoke of Aliwal.

regiments who was armed with a lance, and when we came out my good friend Walter Fane observing that he was without his lance, asked him where his lance was. He said he had left it in the body of a Chinaman. I do not think he had. I thought he found it so cumbersome in our hurried flight that he probably got rid of it in some other way, but I never forgot the incident. The Germans after 1870 introduced the carbine into their lancer regiments by giving carbines to one of the four divisions of which each squadron was composed. Now, I fancy they have given them all carbines; but I perfectly remember in the China War our two native cavalry regiments had only a certain number of carbines distributed amongst them, and I think they were passed on from hand to hand when the men went on outpost duty. I know the Indian Government, which is not always much wiser than our own, armed the whole of Fane's regiment—only two squadrons—with carbines. I was left with my friend Peter Lumsden to assist Sir R. Napier in the embarkation of the cavalry and artillery in Calcutta, and I do not know who it was came to me and said, "For God's sake, Walker, if you have any influence with the Chief, get him to take away some of these carbines." It ended in my making a special report to Sir Robert Napier, who, after considering the question very carefully, and, as he told me the next day, having sat up half the night reading authorities, and consulting everybody he could get hold of, formed the conclusion that they should not all have carbines, but only a certain proportion. I forget what that proportion was. Colonel Elias, in his lecture, mentioned the pennon. I honestly confess, having devoted my mind to considerable thought on cavalry subjects, I never could make out what the use of the pennon was. I was told that the advantage of it was to frighten the enemy's horses, but Colonel Elias tell us that the disadvantage of it is that you frighten the enemy's horse to the extent that he swerves away, and spoils your point. The opinion that I formed was that pricking the nose of your enemy's horse, if he was not too close to you at the time, was far more likely to get him off than the pennon, and, certainly, having been a great deal employed in reconnoitring duty, I can answer for the disadvantage of the pennons that they show a great deal more than one wants to show; indeed, there are times when unless the lances are carried on the thigh they tell more to the enemy than perhaps is altogether advantageous, because you see the points of the lances long before you distinguish the uniform of those who carry them. I remember another point upon which I think General Sir John Watson will probably agree with me. When I was a cavalry soldier I never would allow a man to call himself a made soldier until he had been three years in the regiment. I always called him a recruit up to that time, and I then upon considering the matter came to the conclusion that no lancer was really a made man until he had been four years at his work: that it took one more year to make a good lancer than it did to make a good dragoon. How that opinion will go down in the present days of short service, and turning men out just as they are beginning to get into their work, I do not quite know. I think there is little doubt that the lance is not the weapon of which you can make the most use in the actual *mêlée*, and there is certainly one point in favour of the sword. Though I am a strong advocate for pointing with the sword on every possible occasion, in the *mêlée* you must cut yourself out; you cannot point yourself out, because you simply leave the sword in the man's body, and he cuts you over the head before you can get it out again. Therefore, in the actual *mêlée*, if you cannot use your lance, but are reduced to the sword, cut yourself out. It has warmed my heart to see a 16th Lancer man on his legs, because when I as an infantry Captain went into the cavalry the man who made me was an old 16th Lancer of the name of Blinkhorn, who was the riding-master of my regiment and a subaltern in my troop, and who was, without exception, the best and most practical soldier I ever talked to. I learnt most from him during a long march that I had with him of eighteen or twenty days. I really learnt more of my duties by riding with Blinkhorn than I did in any other way. Blinkhorn told me that one of the greatest nuisances in India was that the broken Indians threw themselves down on their faces with a musket, if they had one, under them, and as you passed them they got up and fired at you. He said that in the old 16th they had one invariable rule when in pursuit, and it is in pursuit that perhaps lancers are more formidable than upon any other occasion except in the great shock. He said: "We had one invariable rule,

and that was that where we saw a fellow lying down on the ground we reversed the lance and dropped the point of it between his shoulder-blades, which effectually put a stop to his getting up and firing at us from behind." There was one very noted instance of that in the case of Goddard of the 14th Light Dragoons, who was shot by a man after one of the great Sikh battles whom he had saved from a lancer who was riding near him and wanted to do this. He said, "Oh! no, let the fellow alone," and the return he had was that this man jumped up from his recumbent position and shot him through the ankle. That I remember as well as possible, he being a county man of my own, I often heard the story told. I think we are very much indebted to Colonel Elias for his lecture, not the less so because he has compressed a very considerable amount of information into a short lecture, and I wish as a constant attendant on the lectures here, and through the kindness of my friends often in the Chair, that I might be allowed to make the remark that there is no greater mistake than giving a very long lecture, because it stops discussion afterwards, and, after all, however good the lecture may be, we get a great deal from the discussion, which in many cases brings out the experience of Officers, and the careful thought which they have given to these matters. I, therefore, ask you to allow me to tender your thanks to Colonel Elias for his lecture, and I may also personally, as Chairman, be allowed to say that we owe much thanks to the gentlemen who have spoken upon this occasion.

Friday, May 10, 1889.

MAJOR-GENERAL PHILIP SMITH, C.B. (Commanding Home District),
Member of Council, in the Chair.

BATTLE TRAINING OF REGIMENTAL OFFICERS.

By Colonel A. B. TULLOCH, C.B.

Colonel TULLOCH: Before commencing to read this paper I wish to state that when I wrote out the first half of it last October, on the termination of my command, I had no idea of reading a paper on the subject. I simply considered it my duty on finishing my command to make certain notes of what I considered were defects with reference to our present modern method of troop training, and to submit them. A high authority very kindly suggested that the subject was one which should be discussed in this Institution. Naturally I was proud that such a suggestion should be made, and the Council very kindly gave me a day for it. The title of the paper is possibly rather sensational. All I can say is, that it is difficult for me to select another. Military training does not exactly express what I mean: military training consists of a variety of exercises, beginning at squad drill, company drill, battalion drill, musketry drill, and so forth, but battle training, as I intend it, means the tactical instruction by the Colonel with the assembled battalion—a thorough course of instruction practically carried out, and to which must be added the verbal instruction of the Officers assembled in one body by the Commanding Officer of the battalion. It is quite possible that some Officers will not agree with me. All I can say is, I have thought the subject out very carefully, and when abroad I have compared our system with that of the French and German Armies. I may mention I have never had the slightest difficulty with French or German Officers when looking on at their manœuvres; the Officers of both these countries have been only too ready to give me any information I wanted, they used even to let me know when any important manœuvre was going to take place in order that I might be there in time. Of course the paper itself is almost too professional, consisting mainly as it does of purely regimental matters, but, nevertheless, I do hope that my ideas may be improved upon by others, and especially by those Officers who are looking forward to that most responsible, but proudest position a soldier can hold, the command of a British regiment.

THERE can be but few Colonels who, during their four years' tenure of command, have not wished to submit suggestions of various descriptions in connection with their duties. Occasionally these ideas are placed on record; but, as a rule, a very proper, diffident feeling that the authorities know all about what is necessary, and have very good reasons for everything done or undone, prevents a Commanding Officer from bringing forward his views.

I trust, however, that as I have now finished my term of regimental command, during six months of which I was in command of a brigade, I shall not be considered presumptuous in expressing my opinions on certain weak points of our regimental system in training Officers and men for the *raison d'être* of their maintenance by the State, viz., the day of battle.

Notwithstanding the adverse views of innumerable critics, I maintain that in what is usually known as drill, in discipline, and in interior economy, we are certainly equally to, and in many cases superior to, the best Continental troops. In a good regiment, everything inside the barrack railings is as near perfection as possible, but in that practical training which can only be imparted on other ground than the barrack square, we are, I have no hesitation in saying, lamentably deficient. Individual Commanding Officers may break through the ordinary routine of our Service, and consider it their duty to do more than will enable their regiments to pass a creditable annual inspection; but putting on one side what is now military history, one has only to look on at an English field-day where a free hand is given to the Commanders attacking and defending, to see at once that far too many regimental Officers seem almost bewildered at finding themselves called upon to do work which to them is almost like being required suddenly to speak a new language; the grammar of that language which is contained in the drill-book and in which they are so perfect on the parade-ground, they find themselves unable to make use of. With some Commanding Officers who are given temporary command of a brigade for the day, the spectacle is occasionally painful, showing very plainly how little they have really studied their profession, and yet these same Officers may know the drill-book perfectly, and be quite capable of manœuvring three or four battalions in what is known as steady brigade drill.

In mentioning steady drill, I in no way presume to suggest that it is unnecessary. Precise machine-like drill most rigidly carried out is the necessary foundation on which battle training has afterwards to be built. No one who has watched the rigid drill and iron parade-ground discipline of Prussian battalions before commencing their field manœuvres can doubt its use, even if one's own professional experience did not prove its inestimable value as a means to an end; but unfortunately we do not as yet go sufficiently beyond this necessary foundation of steady drill.

During the last few years we have, in company tactical courses; instruction in night attacks; infantry fire, and such like, begun to move in the right direction, but something more is necessary, and it is for the purpose of bringing forward a Commanding Officer's ideas on the subject, that I venture with the greatest diffidence to submit my views on this important question.

Before stating what I think requisite for the proper tactical training of a regiment, it will be advisable to refer to the professional instruction which young Officers receive before they join.

The Service is supplied with Officers from three sources: the Military College at Sandhurst, the militia, and the ranks. These

last are comparatively so few in number that they are hardly worth mentioning excepting to say that a great proportion are now gentlemen; several being Sandhurst failures who could not afford the cost of the militia trainings. To get into the Military College, a competitive examination in general education has to be passed, this has now become so severe that upwards of half marks have to be obtained in the few subjects allowed to be taken up, and every year the figure required for passing is getting higher. Certainly since French and German were made two of the four best-marked subjects, no fault can be found with the general education of Officers joining from Sandhurst; the only defect seems to be the almost absurd amount of algebra now necessary for a good place in mathematics. During the year, or rather eight months at Sandhurst, professional subjects only are taught, the special value of the instruction being its practical nature. The passing out standard is not difficult, and might, I think, be raised without requiring cadets to study too much; at present they seem to have rather more time for amusement than is necessary. If some of these leisure hours could be added to the practical outdoor work, it would be greatly to the advantage of these future Officers, few will ever have such chances of thorough instruction again, and it seems a mistake not to oblige them to take every possible advantage of it.

With the exception of one young Officer of defective principles who got into such financial trouble that he had to leave the Service, all who have come to my regiment from Sandhurst since I obtained command of it, have been first rate material, strong, active young men, of good education, and well instructed in everything they had learnt at the College.

All things considered, I venture to think it a misfortune that we cannot get all our Officers through Sandhurst only. The Officers coming from the militia are composed of those who have been unsuccessful in their attempts to enter Sandhurst, or those whose education has been so neglected that they would have no chance if they tried for it, and a few well-educated men who have developed a taste for soldiering when past the Sandhurst age.

Militia candidates have to pass a qualifying examination in general education; that this is not particularly hard may be inferred from the fact that less than quarter marks only are necessary in papers which are distinctly easier than those for entrance to Sandhurst. A large percentage of the Sandhurst failures having made enough marks to pass the militia educational test, are not required to go up for this examination at all. Militia candidates are also obliged to pass a competitive examination in professional subjects. It has been stated that these papers are more difficult than those given to cadets at the Military College, but as the examination is only a written one, such a test without a practical course is of very little value, when compared with Sandhurst instruction. Unfortunately when actually tried in outdoor work after joining, I have found that some Officers from the militia really knew next to nothing about those subjects in which they had passed a competitive examination; their knowledge was of

the most parrot-like description; I have found them quite unable even to point out how an outpost should be strengthened, or a small position entrenched; and when asked to make a little sketch, showing positions of picquet and sentries, the production has been such as an intelligent private soldier might have attempted. They said they had never learned anything of the kind; as such practical work was not required in their examination. Naturally they were ordered to learn what they could, but until they had an opportunity of attending a garrison class, they would be in comparative ignorance of subjects with which Sandhurst cadets have a very fair acquaintance, and which every Officer ought to know on joining.

A strong point has been made by those who believe in the system of entrance by the militia, that the candidates know their drill. All I can say is that I have never yet found them to be in any way better than the Sandhurst cadets. Two months' preliminary drill, and then two periods of one month each at yearly intervals, are not likely to make lasting impressions.

The argument that the present system answers, in that it fills the subalterns' lists of militia regiments, and that it is a cheap one for the public, should not be allowed to carry any weight unless the subalterns entering the line are properly qualified. This, I think, might be arranged for, and without putting the candidates to additional expense. There would not also be much reason to complain (admitting that the educational test is so much below Sandhurst), if a fair colloquial knowledge of either French or German were added. Four months' residence abroad in a family where no English is spoken would be sufficient for this.

As regards surveying and a practical knowledge of field fortification, proper courses of instruction are necessary. Militia Officers cannot go to Chatham, but there is no reason why a special school should not be instituted for their benefit, say, at Aldershot—Officers to pay the actual cost of their teaching. There are many well-qualified retired Officers who would be only too glad of the occupation, especially if such added to their incomes. It will be said this would be an additional expense for militia candidates, but it would not be so if their second annual training were abolished in favour of the school of instruction referred to; it seems hardly credible, but I have several times been informed that a month's mess bill, and attendant and unavoidable expenses, when out with many militia regiments, comes to 40*l*. Now, with proper arrangements, one quarter of this amount should be sufficient to meet the cost of six weeks' instruction in elementary field fortification and surveying, which period would be long enough when working at least six hours per day. Militia candidates should be required to get a certificate from the school of instruction before being gazetted. If properly qualified in book work to benefit by a practical course, they might be allowed to attend the school at any time. I consider it advisable to point out the necessity for their having learnt what is required before attending a field works and surveying school of instruction, because young gentlemen can enter the militia without any examination whatever;

in many cases they can neither write nor spell correctly, and yet have the right to put on their cards that they belong to a regiment of the line. Such English Officers of the reserve forces at times astonish their Continental brethren when on their travels, and give anything but an exalted idea of the commissioned ranks of the English Army.

To sum up—young Officers who now join are, as regards education, decidedly superior to what they were even twenty years ago, and if the militia candidates were properly instructed in field fortification and military sketching, little more would be required. The social status from which Officers come is quite as good as ever it was, and in some respects there is an improvement; the young men who in former days were occasionally sent into the line, and extravagantly maintained by their wealthy *nouveaux riches* relations for a few years till they got their companies, have been eliminated. As a rule, young Officers joining the infantry intend making a real business of soldiering.

Not very long since, a good deal of nonsense was current about young Officers being mere bookworms, and that so much learning (?) would cause physical degeneration; it might just as well be said that naval Officers were becoming spectacled professors because they had now to go rather deeply into mathematics and electricity for torpedo work. The only physical defect I have ever noticed has been that of short sight; fortunately recent regulations make the medical examination on this point much stricter than it was. Infantry Officers obliged to use glasses have done uncommonly good service, but now that there is so much long-range work, and when there is such a superabundant choice of candidates, no one obliged to use an eyeglass ought to receive a commission. As for the physical qualifications of young Officers, it would be impossible to wish for anything better. A regimental football team is a sight worth looking at; for such young athletes a Roman trainer of gladiators would have offered many *aurei*. The natural adventure-loving proclivities of the race, the physical training from the earliest days of schoolboy life, to say nothing of the energetic amusements when in the Service—so different from those of Continental Officers—and that hunting instinct so strongly engrained in all which causes the British Officer to undergo almost any self-denial or privation in pursuit of sport, be the object what it may, from a snipe to a tiger, gives us the most perfect material for leaders of men.

With such qualifications to start with, it must be entirely owing to defects in our system of regimental instruction that our Officers are not just as superior to those of the Continent in professional matters as they are in body and race qualifications so suitable above all others for a soldier's life.

If this defective training were simply the result of neglect and ignorance of the value of tactical instruction, the remedy at every station would be simple. Unfortunately, owing to the peculiar garrison duty which British regiments have to perform in different parts of the world, suitable ground for battle training is often most difficult

to obtain. Some foreign stations, such as Malta, almost preclude proper instruction, whilst at home a Commanding Officer must, in the absence of proper ground, obtain permission from landowners, which is not always an easy matter, but by no means so difficult as is generally supposed, and a very little assistance from the proper authorities in getting permission for troops to manœuvre on open ground in the vicinity of military stations would greatly facilitate this. Government land even is not always turned to proper account, a barrack-square has so long been considered sufficient for the requirements of a regiment that wide expanses of War Department land, within easy reach of a large garrison, have before now been let out at a small rent for grazing, and the troops prohibited from using them; in one case, a battery of field artillery was actually forbidden to use the large drill-ground attached to the barracks till a farmer had got his annual crop of hay off it. Foreign armies are very differently situated—on the Continent every garrison of any size has its exercise-ground, often a square mile in extent, and during autumn manœuvres the army has practically the run of the whole country. To hope for such advantages in the United Kingdom would be useless; but still Commanding Officers who are determined to train their battalions as they ought to be trained can generally manage to work over ground, provided no damage is done to crops or fences; this has been done even in Ireland, where the red coat is not in particular favour. Commanding Officers whose regiments are at either of the camps of instruction have immense advantage over those in other stations; the value of even three or four weeks in camp near suitable ground are so great that no Officer commanding a line battalion can ever see a volunteer regiment in tents on open down land without envying the facilities given to the auxiliary forces for learning their work.

In India we are, as regards training-ground, quite on an equality with Continental troops, and on some foreign stations, such as South Africa and Egypt, better exercising ground could not be wished for; but in troop training, as in everything else, "where there's a will there's a way," and if battle training were required of all Commanding Officers, they would find means to carry it out; but to do so effectually, they must be properly backed up in the work. One great drawback to the proper training of their regiments is the number of men taken away for various employments by the Staff and Departments; servants, batmen, orderlies, engineer working parties, ordnance fatigues, and such like, often at times reduce a battalion to such an extent as to render hopeless the efforts of the most energetic Commanding Officer. Occasionally a C.R.E. or Departmental Officer arranges with a Colonel that his men shall not be taken away for one or two mornings in the week, but to get hold of the numerous orderlies, servants, batmen, &c., even for an early parade, is a much more difficult matter, although these same orderlies may not actually be required at the offices for which they have been requisitioned before nine or even ten o'clock.

The first thing to be done is to place every employed man, without

any exception, at his Colonel's disposal for, say, half a day in each week during the drill season, viz., from daylight till noon; on that day, every one, excepting the sick, a small regimental guard, and three or four police to patrol about the barracks, to be in the ranks; musketry (recruits excepted) and company training being suspended for the half day.

It may here be stated that the annual company training might be somewhat reduced as regards time if recruits on joining were put through a short course of field works as well as musketry.

This special weekly parade should be exclusively for tactical instruction. Breakfasting at or before daybreak, there would be ample time for work even if the ground were six or seven miles away. The scheme for the day should be published in regimental orders the week before, and all Officers required to examine the ground and give in a short report of a few lines and a rough eye-sketch of the dispositions each would adopt to meet the object in view. Possibly some of the younger Officers might not produce anything remarkable, but obliging them to work out either attack or defence by themselves and then showing how it should be done would be of immense value; there could be no better training for them than practically seeing the mistakes they had made.

Each scheme should be done twice: the first time without ammunition, the second with blank cartridge; the annual allowance being increased for this purpose.

The day after each exercise, all Officers should be assembled, and the Commanding Officer should himself point out all the mistakes made, and then answer all questions which the young Officers especially should be encouraged to ask, so that they may fully benefit by what has been done.

It may be said that a tactical brigade day once a week would fulfil all that is required, but this is not so. During the progress of tactical instruction under the Commanding Officer, he can at once stop the movements if anything is going decidedly wrong, and correct it, or begin the whole exercise over again if necessary. His parade is purely for instruction, and occasionally mistakes made and then and there corrected are the very best teaching that can be given. Naturally the General (if there be one at the station) would come to look on, but he should be most careful never to interfere, except in taking notes for after discussion with the Colonel.

Where circumstances permit, it is very useful to assemble all the non-commissioned officers in the recreation room the day after some specially interesting field-day, and give them a short lecture on the work done, using a blackboard and chalk; the interest they take in the proceedings, and the latent talent some of them unmistakably show when questioned, will more than reward a Commanding Officer for any trouble he may take with them.

A mistake is sometimes made when regularly teaching non-commissioned officers anything beyond barrack-square work, in giving them matter to consider which is really above their comprehension; occasionally a brilliant exception may be found, but, as a rule, their

intellectual training has not been sufficient to enable them to benefit by any but the most elementary lectures. After going through a short course under a Garrison Instructor, they too often get a firm hold of a few maxims or principles, which they apply indiscriminately, without in the least considering what their relative bearing may be as regards other matters.

Excepting the senior Major (who would look over the papers and record all necessary observations on each, before passing them to the Colonel), all Officers present with a regiment during the winter months at home and the hot weather abroad, should be given a scheme once a fortnight, such as the defence of a house, the entrenching of a small position, the dispositions necessary for the defence of some particular bridge, and such like; the reports in each scheme to contain full details of dispositions proposed, working parties, &c.; the sketches to be clear, but as simple as possible.

When the defence schemes were completed, attack schemes on the same posts or positions might be given. When giving out each scheme, a short lecture in the orderly-room by the Commanding Officer is advisable. The danger to guard against in these schemes is that of making them too grand; the number of men given in each case, and the time allowed, should be such as the Officers of different grades might actually have at their disposal on active service.

I am aware that at home during the winter time reconnaissance sketches and reports are made, but, excepting as instruction in field sketching, I fail to see what special benefit these sketches and reports may have. Too often a pretty picture, with beautifully tinted woods, houses, and streams, is held up for admiration; the production being generally that of some young Officer of artistic tastes. Whenever one of these pretty pictures was placed before me, I at once doubted its value, and an examination of the ground, as a rule, proved that truth had been sacrificed to art.

Several years ago at Aldershot there was a great craze for these reconnaissance sketches, and some Officers, whose military education had been neglected, got a good deal of assistance; a sapper corporal made quite a small income by supplying what was required in the way of drawing: I believe his charge was half-a-crown a sketch.

For cavalry Officers and even cavalry non-commissioned officers, rapid sketching and road reporting is particularly useful; but as regards the infantry, let them first of all be well exercised in those subjects which it is absolutely necessary they should know thoroughly. All Officers should, as part of their surveying instruction, be able to make a good road report; but Sandhurst or the Garrison Instructor should teach them that part of their work. As it is, or was, the office of the Assistant Quartermaster-General in home districts is periodically inundated with subalterns' road reports, forwarded by Commanding Officers, simply because reconnaissance work in the field is part of the Quartermaster-General's duty. Certainly it never could have been intended that in large garrisons he should become a surveying instructor. The magnificent schemes of some young Officers and non-commissioned officers, who would be puzzled how to com-

mand a picquet, are at times startling : such teaching is decidedly a move in the wrong direction. Even with Officers who some years ago were told off to work for the Intelligence Department in the scheme for home defence, the productions were astonishing : positions were taken up and reported on quite regardless of the direction in which they faced, or of the force which would be available to defend them.

Tactical instruction requires to be commenced with a small number of men, be they on paper or in actual existence ; and one of the very best means for facilitating the instruction of Officers of all ranks is unquestionably the War Game, on a raised model, the invention of Colonel Shaw, who was formerly Garrison Instructor at Aldershot ; the only improvement which seems possible is some simplification of the rules regarding losses. Kriegsspiel, with maps, is all very well for students at the Staff College, and those well advanced in the knowledge of their profession ; but to enable young Officers to read country easily and get a proper eye for ground, nothing I have yet seen comes up to Colonel Shaw's invention ; even for old Officers who have had the experience of several campaigns, the writing out of the instructions necessary for their different commanders in a war game scheme is most useful. Unquestionably every garrison ought to have a war game model, and its use should be compulsory. At first Officers are rather apt to be disheartened, not to say disgusted, when they make absurd mistakes and are shown up by the umpire ; but in time they get over this, and when they at last beat a less skilful antagonist, are just as much in favour of the game as they were formerly against it.

During the winter at home and the hot seasons abroad, the war game is a very profitable way of occupying spare time ; a game might be played once a fortnight, alternately with an outdoor scheme, each regiment in turn to have the use of the war game room ; the Colonel to make his own arrangements and be chief umpire.

It will be said that regimental Officers have already as much as they can manage in the way of musketry, company tactics, signalling, &c. ; all I can state in answer is, that I have seen such a course of instruction as I mention carried out without a whisper of its being found inconvenient ; all the Officers seemed only too thankful to get a chance of being systematically taught their trade, and an occasional discussion in the ante-room about a scheme seemed to be quite an agreeable variation from the performances of some wonderful polo pony or the chances of a regimental horse winning a particular race at the next meeting. The equine vein (if I may use such an expression), which is more or less developed in every one born north of the English Channel, at times occupies, I venture to think, too much of some young Officers' thoughts, contrasting strangely with the conversation one hears, for instance, in a naval club, where guns, rams, and torpedoes are so often spoken of, showing what is uppermost in the nautical mind. No one can accuse naval Officers of being mere bookworms, or of caring less about sport when on shore than ourselves, but somehow their profession seems to be far more deeply

engrained in their nature than with us: cannot we soldiers take a leaf out of the naval book and work at our trade as our blue-jacket brothers do? In the Navy such a thing as a young Officer really ignorant of his profession is unknown; can the same be said of us? We have plenty of spare time and a first-rate material to work with; all that is needed is complete instruction.

Now, with regard to the scheme proposed, not even the most ancient field Officer could grumble at the addition of the fifteen or sixteen interesting tactical exercises during the drill season, even if they began at daybreak. The schemes and war games during the leave season would be not an unpleasant way of passing the time when wet or hot weather puts a stop to regular outdoor amusements; they need not prevent a single day's hunting at home or shooting abroad, as there would be a whole fortnight for the work, and, indeed, there could be no greater mistake than to place obstacles in the way of Officers getting away, during the slack season, for either of these amusements. Whenever young Officers stationed abroad can afford—say a week's shooting expedition—every facility should be given them for it; such expeditions are in themselves a species of military training. I have always noticed that good sportsmen are the best Officers, and are as keen at their trade of soldiering as they are at field amusements. To keep Officers continually within hail of a barrack-square, when there is really no necessity for the whole of them being present, is one of the surest methods of making them weary of their profession and slack in their work.

Of course, on the war game day, which would be only once a fortnight, everyone not on long leave would require to be present. The Commanding Officer and senior Major would have a good deal of additional work; but considering that an average of two hours per day for ordinary routine is really all that a Commanding Officer need pass in the orderly-room or drilling on his parade-ground, I don't think there would be any just grounds for saying the additional work would be too much. Of course a Commanding Officer can be all day in his orderly-room, and may almost have a fit if anyone else drills the regiment, but if he cannot trust his subordinates to do their duty, the difficulty does not reflect much credit on his own organization and management.

In giving an average of two hours per day, I do not, for one moment, mean to say this is all the time a Commanding Officer should be, so to say, on duty within the barrack-gates. Like the chief engineer on board a huge steamer, he must be always quietly observing that his subordinates are all doing what is required of them, that there is no friction anywhere, and that the whole mass of machinery is working smoothly and quietly.

The first criticisms of the scheme by the senior Major before forwarding them for the Colonel's observations would be most valuable instruction for him, particularly if it obliged him to study his profession rather more than some old Officers do at present. His remarks on the schemes would assist his Colonel and also the General in forming an opinion as to his professional knowledge

when noting his qualifications for promotion to that most responsible post, the command of a regiment, where one man carries in his hand the lives of many and the good name of all.

This short essay on "battle training" would be all I should desire to say on the subject, but during my service I have noticed that Officers can pick up useful ideas, not only from other armies, but occasionally also from other regiments in our own Service. I will therefore add a few details as regards regimental work, on the chance of some of them being made use of and improved upon by others.

One of the first subjects which exercises the mind of a Commanding Officer, especially if he commands a foreign battalion, is the musketry training of his drafts, for if the recruits have not been properly taught when a rifle was first placed in their hands, their subsequent instruction is very uphill work. Badly drilled drafts are rare, and besides, it is a defect which can soon be put right, but with recruits who have been allowed to become gun shy, it is a very different matter.

All things considered, I have come to the conclusion that it would be very advantageous to the home as well as to the foreign battalions if recruit musketry instruction could be carried out at the depôt; this, of course, is principally a question of barrack accommodation and ranges, but where it can be done, the Assistant Adjutant and musketry sergeant of the home battalion might very well be borne on the strength of the depôt, where they would also be available for militia recruits. If some re-arrangement of time would permit, it would add greatly to the service value of the militia and their reserve if they could be put through a line recruit's complete course with a few day's field-firing when they join at the depôt; but on this subject Commanding Officers of militia regiments can speak with more authority than their colleagues in the line.

As regards musketry training in both home and foreign battalions, I trust I may not be considered captious when I say that we do not yet recognize the proper value of field-firing. Thanks to Colonel Tongue and those working with him, great progress has been made of late years, but still it seems to me that our instruction is carried out as if a high regimental figure of merit in individual shooting only, and not battle-firing, was the object in view. Good target-shooting on the ranges is of course necessary before commencing more difficult work at unknown distances, but when once a man has attained a certain proficiency at the range-targets, I think the remaining portion of his annual allowance might be more profitably expended than at present, and an additional number of cartridges given to all for systematic field-firing.

To train a man to shoot properly in the open, a special course of field-firing *instruction*, in addition to range practice, is necessary. At present our field-firing only shows how little we get under the most favourable possible service conditions, after such an immense expenditure on the ranges. Of course as long as regimental figures of merit are published, a good register at the targets, and not battle-shooting, will be the result. Some regiments, particularly in

colonial stations, occasionally make a very high figure; on investigation I think it will be found that these extraordinary scores have been made by never shooting when there was wind or bad weather—about the most unsuitable system as a training for field service that could well be imagined.

The Continental method of judging as to the efficiency of a regiment's firing is very different from ours, and I think very much better. Some of their plans of appearing and disappearing targets for training their men on the ranges are also so simple, and yet so excellent, that it seems a pity they have not been adopted by us. In India and the Colonies, where shooting ground is not difficult to obtain, the Prussian system might certainly be tried.

Aiming and judging distance drill between the annual courses was a move in the right direction, but the way in which it is carried out is generally too perfunctory. Instead of the companies being worked in their regular company squads, the different groups should be arranged according to their proficiency; bad and indifferent shots only should be kept at "wall winking," whereas all soldiers who know how to shoot should go well beyond such elementary drill. Two parties might work against each other, advancing and retiring slowly, the utmost care being given to adjustment of sights and position, the lines to be halted whenever there was the slightest occasion for any special correction. Men who know how to use their rifles naturally soon get sick of poking drill and wall winking, but when men or even animals in motion are given them to aim at, they instantly become interested and keen in what they are doing. By working this system properly, it might be made not only an aiming-drill practice, but also a method of assisting in teaching fire discipline, a subject about which many Officers know next to nothing.

Before quitting this question it may be as well to state that it would be very advisable to teach young Officers on joining how to use a revolver properly; all company Officers should also go through an annual course. At present the only training an Officer in the English Army receives in the use of his weapons is that startling performance which an Inspecting General has to certify he has seen, viz., the sword exercise, apparently the invention of some one who in his younger days must have been deeply impressed with the heroic performances of the British tar on the stage of some transpontine theatre when rescuing his Susan from the minions of Captain Cross-tree. It may be useful to state that it is advisable to get through this curious and slightly dangerous drill before instead of after an inspection lunch. All Officers ought to be able to use their swords, and for that purpose recruit Officers should be taught the proper cuts and guards, and then have regular single-stick exercise.

When young Officers have passed their squad drill and completed their musketry course, the next subject is company drill; but before entrusting them with even a section, a special course of "word of command" drill is very advisable, by placing them round the barrack-square at 50 or 60 yards' interval, and making them pass given orders. Not only does this practice give them confidence in them-

selves, but, when properly taught, it prevents them ever afterwards from falling into that most pernicious habit of giving feeble or hesitating words of command, which is about the most certain method of making well-trained men drill badly. For this reason I consider it advisable to use ropes and as few men as possible when commencing to instruct recruit Officers to command companies; even on my own parade I found it a good plan to halt the battalion instantly if an Officer (no matter of what rank) failed to give a sufficiently sharp decided word of command.

Word of command drill should also, I think, be one of the first exercises for newly appointed non-commissioned officers, who will then have to take charge of small guards and such like.

It may seem that too much importance is given to this drill, but it is really one of the principal factors in producing that steadiness on barrack-square parades which, as has already been stated, is the necessary foundation for battle training. With regard to these barrack-square drills, I may say that I never found it necessary to have more than one Commanding Officer's parade a week, but then everyone understood why these drills were conducted so differently from the tactical exercises, and why the men on these parades were to be automats, and had to work with the precision of machinery. They also knew that the very slightest movement in the ranks would bring its subsequent result as laid down in the regimental scale of punishment. One Commanding Officer's steady drill per week may in the opinion of some be hardly enough; but when an Adjutant does his own particular duty properly, no imperfectly trained recruit, Officer or soldier, should be allowed to appear on a Commanding Officer's parade.

I may mention that with most of our foreign battalions the men know their drill so thoroughly that they can work on one executive work of command only, without a single Officer or non-commissioned officer to assist; after one or two drills to get them used to the novelty of it, the companies will step off at the right moment and move with the rigidity of red brick walls. Of course this is a very exceptional exercise, but it is an effective test as regards the instruction of the men. With some Officers, who only see the Continental Armies working in apparently loose order at their autumn manœuvres, the machine-like drill of the barrack-square is considered a waste of time; could these Officers be present but one day in the early summer with a Prussian company it is probable their ideas would be somewhat altered. Continental Armies have, however, this advantage over us, viz., that all their drill is organized with one object in view—the battle-field.

But in this comparison with Continentals it must not be overlooked that we have as a rule to fight semi-civilized enemies whose shooting power is limited and who, therefore, trust to a cavalry-like dash with sword and spear. Against such an attack the shoulder-to-shoulder formation is the proper one. For night attacks and night marches the rigid training of the barrack-square is very essential; the importance, therefore, of the steady drill must on no account be overlooked; but when once men are properly trained to it, a comparatively

small weekly allowance of time for such parades is all that is required.

Before leaving the barrack-square, I venture to submit that the drill instruction of Officers and non-commissioned officers should be carried out rather more systematically than it usually is at present. The Adjutant, on his parade with the young Officers, should go steadily through the book; a very few movements each time; the sergeant-major doing the same with the non-commissioned officers, amongst whom every sergeant should be thoroughly at his ease when commanding a company. In the book-work instruction, plain flat pieces of stick to represent sections, companies, &c., with round and square markers for guides and commanders, should always be used by the senior Major at the weekly school; each young Officer placing them in position in addition to giving a verbal explanation.

Passing on to tactical instruction, all I shall have to say with regard to details is, that I think we ought to work more frequently in quarter battalion columns, that is, in double companies, one of which should always be ready to support the other, and when once the double company column has been launched forward by the Officer commanding the battalion, he should interfere with it as little as possible. Majors and Captains ought to be regularly *trained* to rely on their own judgment when reinforcing instead of waiting in the helpless way occasionally observable, or, in desperation, blundering forward recklessly, which would ensure the destruction of those under their command. In criticizing the exercise after the day's work is over it is essential to be careful to avoid saying anything on parade which can be construed into a reflection on the capability of an Officer; that should be reserved for private discussion in the orderly-room, and then encouragement to do better next time and not condemnation will work wonders.

Before quitting the subject of tactical instruction it may be as well to say something about our present system of making work fit in between the regulation breakfast and dinner hours. As regards this last, surely men ought to be trained to work occasionally with bread in their haversacks for a "bite" in the middle of the day, and with full water-bottles, which were not to be used till the bread was eaten; with sharp punishment for any infringement of this order and any attempt to fall out to drink at streams, men soon learn to exercise a little foresight as regards husbanding their supplies; at present, by doing everything for the soldier, and, in fact, treating him almost like a Sunday-school infant out for a picnic, whenever he is taken away from his barracks, we do our best to make him as helpless as a child; and if the sun be particularly hot or the day wet, the parade is cancelled.

Now, endless experience in hot climates has shown that men who are well fed and properly clothed can stand work in the sun, provided it is interesting or money-producing, and be in far better health than when shut up in barracks, sleeping themselves into liver complaints and a thirst which heavy canteen beer alone seems able to quench.

As regards proper feeding, that is really entirely in the hands of the

Commanding Officer, who can raise the daily mess contribution to all that is required for harder work than ordinary parades, and with a General who does not fear that bugbear of superior Officers, viz., "responsibility," a Colonel may be allowed to dress his men in such a way that a long day's interesting tactical work is quite looked forward to by them. I may mention that in Southern Natal, which has a sub-tropical climate, I was permitted, as an experiment, to discard the heavy scarlet kersey for work beyond the barrack-square, using the second grey flannel shirt as a blouse instead; with throats quite exposed and loose shirt sleeves the men were as freely dressed as blue-jackets; the chain and brass ornaments being taken off the white helmet, it then became a light, comfortable headdress fit for the purpose intended. Not only was this grey dress well suited for work, but when put on properly it had a particularly good appearance, and was eventually adopted by all the troops in South Africa when working on the veldt. I may mention that the second loose flannel shirt with air space between the two was found to be a decided protection from the heat of the sun on the back.

It may be said, Why should any deviation be made from the regulation dress? The answer to that is that the thick regulation kersey was, in that climate, unfit for four or five hours' hard work in a hot sun over the Maritzburg hills.

Doubtless in time we shall get a regulation dress for field service, but up to the present it has not been seen; shape, colour, and material have so many different advocates for each. As regards the first, although no Officer would for one instant think of using his town suit for shooting in, some Commanding Officers, for the sake of appearance, sanction the soldier's shooting coat, that is to say, his kersey, being made so tight that when he is in marching order he is about as free to use his limbs as a trussed fowl. The men themselves, if permitted, have also an extraordinary fancy for trousers tight about the knee and wide over the foot, whilst the very opposite should be the case; and as for pockets, anywhere for spare ammunition, &c., such an idea is apparently beyond the pale of consideration.

As regards colour, some Officers see nothing objectionable in bright scarlet for active service. Now, considering how conspicuous red masses are, even at the longest artillery range (and in the present day good practice can be made at 3 miles), it is surely time to reflect whether we are right in making such targets of our men. Prussian Officers have told me that even the dull red trousers of the French in the 1870 Campaign were often very conspicuous and particularly disadvantageous to them. So impressed did these Prussian Officers become for the necessity of diminishing as far as possible anything about their dress which would assist the French in aiming that some regiments blackened the brass work of their helmets. It certainly seems strange that some Officers do not see the disadvantages of bright scarlet; the only solution I can arrive at is that they, without knowing it, are more or less affected with what is known as colour-blindness, and that which to another man is a bright staring colour is to them a dark purple or even a dull neutral tint. On active service,

where suitable stuff for removing perspiration and grease stains cannot be carried, the bright scarlet kersey or serge soon becomes filthy to behold, and yet in the distance the mass of men in scarlet is as distinct a target as ever.

The best dress I have yet seen for field service is that of the mountain batteries in India. As for colour, I think the smartest neutral tint is a reddish-grey formerly worn by a Hertfordshire regiment of volunteers. To part with the time-honoured English red coat would be far too great a wrench, but the difficulty might be got over by every soldier having a scarlet tunic for special parades and for walking out; this tunic to be consigned to the squad-bag and left behind on going into service.

But to return to the subject of the lecture, viz., "battle training." Having now mentioned the principal subjects in which a Commanding Officer can himself instruct his Officers without reference to anyone, it may, in conclusion, be as well to point out how assistance can be given by higher authority.

The absolute necessity for placing every man at the Colonel's disposal for tactical instruction for half a day in each week has already been referred to; now in addition to this positive aid, it has often occurred to me that a Commanding Officer might be materially helped, by taking off his back a good deal of negative work—if I may so term it—such as reducing the clerical work in the orderly-room. One sergeant and two assistants are always writing, and sometimes it is even necessary to add a third, compiling Returns and such like documents called for by every possible authority, and generally in triplicate. Certain quarterly Returns are, of course, necessary for transmission to the Horse Guards, but even these it has often seemed might be diminished in number, and also simplified. As for local Returns, Brigade-Majors and A.A.G's. are, I consider, not a little to blame, they are far too easy in sanctioning the demands of the different departments without thinking of the additional work thrown on the orderly-room clerks and Adjutant who has to check the papers. The Paymasters' and Quartermasters' offices (in both of which two clerks are employed) also contribute their daily supply for the Colonel's perusal and signature.

A move has lately been made in the right direction by simplifying companies' accounts and the Quartermaster's worn-out clothing Returns; surely it is full time some Committee should investigate the necessity for the present absurd amount of orderly-room clerical work. A stringent confidential circular on the subject of local Returns required by Staff and Departments might be a useful commencement.

There are also certain parades or ceremonies which might be modified with advantage, such for instance as that known as "trooping the colours," a weekly performance of which seems rather more than necessary, especially when it requires a General and Staff, and consequently Commanding Officers, to be present. This parade in some stations practically takes away one whole day in each week of the short drill season.

When on this topic I trust I may be pardoned for expressing what many Officers ardently wish for, viz., that we should get back again a flag to take into action instead of the present pair of colours which are presented with much state, and which the Colonel has to declare in a grandiloquent speech will be defended to the last, whilst he knows perfectly well they will be left behind on the regiment going on service. The pair of colours are unquestionably quite unfit for modern warfare, and would entail unnecessary loss of life; but one smaller standard, such as the present Queen's colour, without the fringe and with a shorter pole and smaller crown, would easily roll up, and need not be displayed till the final rush was made: the colour party to be one Officer with a corporal and four men, and its station with the reserve of the battalion. Presented by Royal hands, and the silk kept in repair regimentally, the wood and metal of the colours would last, if need be, for a century; such a standard with the names on the pole of those who might have been killed or wounded when carrying it, would be almost a regimental deity for which every man would gladly give his life. It would indeed be a very different possession from the present fair weather flags which no one can regard with more than official respect.

This digression about colours is rather foreign to the subject of battle training, but not entirely so. I will now, however, finish what I desire to say, by suggesting that those Officers who have special professional knowledge, such as those who have passed the Staff College, and many artillery and engineer Officers, might come forward in large garrisons to give a lecture occasionally to their less well-informed but not less keen brother Officers. Staff College Officers will have several campaigns at their finger ends; surely some of them could give not only very instructive, but extremely interesting lectures; to commence with, the Garrison Instructor might be required to give one such lecture per month during the leave season, or find some capable substitute.

Engineer Officers could give most useful information in showing, for instance, what were the different methods of entrenching positions and posts during the Turco-Russian and Franco-Prussian Wars: an explanation of the various defects and advantages of each would be invaluable to many thoughtful young Officers.

Artillery Officers might explain the mechanism of our new guns, projectiles, and fuzes, and compare ours with those used on the Continent. A detailed account of the effect of different calibres of shells and new explosives on earthworks and buildings would be greedily listened to. Infantry and cavalry Officers in our country, as a rule, know absolutely nothing whatever about artillery fire; now in the present day, this is unquestionably a very serious matter; and in addition to the professional lectures, I think reports of Okehampton field artillery experiments ought to be published for general use; we ought to go even further, and encourage Officers at home to be present at Okehampton during the artillery season, giving special permission for this purpose.

This completes all that I consider I am justified in saying at present

on "the battle training of regimental Officers," but I should like to add that it is very hard on regiments that so many Officers, after being taught their profession, should go to the Indian Staff Corps. Were these Officers supernumeraries from the day they join, there would be no objection; in fact, many Colonels would be only too pleased to receive them on such terms; but to regularly drain off duty Officers, even to one-third of the whole company Officers in one year, is a method of supplying Officers which is doubtless a good bargain for the Indian Government, but it is one which is earned at the expense of the efficiency of the Imperial regiments. Occasionally, letters appear in our leading newspapers, suggesting the four company per battalion system, on the ground that the number of regimental Officers might then be made the same as those on the Continent, viz., sixteen per battalion. Had the writers any practical experience of their subject, they would know that an English Colonel is only too happy if he can, under our present system, ever have such a large number of trained Officers as two per company.

I fear that in touching on the different points bearing on "battle training," I have already made this lecture too long, and I will therefore bring it to an end with a few remarks about the position of a Commanding Officer, on whose shoulders so much is placed, with responsibility and anxieties far exceeding those of any ordinary Staff Officer, and even of some Generals Commanding, and who is worse paid than his own Captains who are employed departmentally; as for table money to assist him (as in the Navy) in entertaining (often a heavy item), he gets absolutely none. When enquiring civilians ask what a Colonel's pay is, many can hardly credit that it is but 18s. a-day and 3s. more when in actual command. Now, all things considered, it would be only right if Colonels were paid the same as Staff Officers of a similar rank; but to carry out this suggestion to its logical conclusion, the command of a regiment would have to be considered as a Staff appointment, and a selection in each case made from a general list of senior Majors.

Note.—The following observations, made during the lecture, do not appear to have been noticed by the shorthand writer: "In speaking of the Officers who come from the militia, I in no way whatever refer to the regular militia Officers, my remarks are solely intended for those young gentlemen who make use of the militia for the purpose of getting into the line."

"Word of command drill."—This is slightly referred to in the Drill Book, page 3, instruction of squads. I need hardly say the system I advocate goes a very long way beyond the paragraph mentioned.

The CHAIRMAN (General Smith): Instead of making remarks at the end of the meeting I will say what I have to say now, in order that I may have the benefit of your opinion upon any points that I may mention with regard to this very interesting lecture. I think Colonel Tulloch was a little hard upon Commanding Officers, when one considers that such a large number of these Officers and Commanding Officers spend their time in garrison towns where there is no opportunity whatever for any field work, and I often wonder that our Commanding Officers and Officers are as good as

they are. The existing arrangements for barracks were made at a time when the conditions of the Service were entirely different from what they are at this moment. The population of the country was then more turbulent, there was no police, there were no railroads and no telegraphs. Surely the time has come when these barracks which often occupy very valuable sites should be sold, and when we should buy tracts of waste country where we could have military camps. As regards the Officers, I am not perfectly certain that I understand what is the great benefit of training Officers at Sandhurst. You send young men from eighteen or nineteen years of age, and you keep them there eight months. At the end of that time they certainly obtain a certain amount of valuable information, but otherwise I should say they had not spent their time so profitably as if instead of going to Sandhurst they had joined their regiments. I think the training of a young Officer is far better conducted in a regiment than in a place like Sandhurst, and I therefore incline to the opinion that we should add to the examination of young Officers who now enter Sandhurst those particular points which they learn at Sandhurst, and we should send them straight to their regiments. With regard to the militia Officers, I fail to understand what is the great object of taking Officers from the militia. It cannot be any great benefit to the militia regiments, because these Officers are taken away from their regiments. Whether it is a back-door for young men who cannot manage to pass examinations I do not know, but if it is I do not think it is for the benefit of the Service. If it is for the benefit of individual Officers, I think it is a false step. The next point I notice is the number of men employed. I have lately had the honour of commanding a brigade at Aldershot, and I perfectly agree that it is heartbreaking, heartbreaking not only for the Commanding Officer of the regiment, but heartbreaking also for the people employing them, because very often there are men employed on very important work. The men are taken away, and the employers have to train ignorant people in important duties which these employed men had to perform. Therefore, it is bad in every way. I should think it would be a capital thing to have a system by which reserve men could be permanently employed. At Aldershot there are men employed in Officers' quarters; there are gardens with ornamental grounds which add to the comforts of the camp, and these might be placed in the hands of men who would be permanently there, and who would take a great interest in them. There are many others: orderlies, men who have to look after the Women's Needlework Association, and all those sort of things, which have not the smallest reference to anything like service, and all these I contend might be well filled by men in the Army Reserve. It would not cost the country very much, and it would have a double advantage, because in time of war you could put your hand on these men, besides the benefit that they would be in their ordinary work. The next memorandum I have made is the report of instruction in the winter. I think Colonel Tulloch is rather hard upon us about these winter reports. I can only say for our work at Aldershot we do exactly what Colonel Tulloch indicates. There is a scheme prepared in the autumn, a certain force is told off for the advanced guard, the enemy is supposed to be in certain places. Then there are four great things at least upon which the Officers are always to report: first, a scheme of outposts; second, the road report; third, the camping ground; and lastly—there may be others—there are the positions upon the line upon which the force could fall back in case of need. That has been done at Aldershot to my certain knowledge for two years. These reports are accompanied by sketches more or less rough; sometimes the greatest praise is given to those most rough, because on examination it is found that they are the most accurate. These have been handed to the Major, and the Major has made his remarks, the Commanding Officer has made his, the General of Brigade has made his, and they have been sent to head-quarters. This system is exactly what Colonel Tulloch thinks should be done, so that I am glad to inform him that it is done and is being done. I am not perfectly certain about the war game model. We have had it at Aldershot, and I dare say for some young Officers it may be a good thing, but I have always thought that maps were the best. The great thing is to learn to work by a map, and every Officer, no matter how young, ought to be made to know what a map is and be obliged to learn to understand it; giving him a model I think is a mistake. The reason, I think, why our friends in the Navy take more interest in their pro-

fession than soldiers is because they have the great advantage of always being on active service. A naval Officer has two enemies, he contends with Nature as well as with his country's enemies. He is always contending with Nature, and that gives a sort of grit to him, which we unfortunate people in the military service cannot get. As regards musketry, nobody more than myself will acknowledge the benefit which Colonel Tongue has rendered to us. The advance in musketry teaching has been very great, but it still partakes too much of the origin of our musketry training. The origin of our musketry training was the Siege of Sebastopol, when the necessity of good individual shooting was very much felt, therefore the great object of the first training of our infantry was to produce good individual shots. The principal object of our musketry training should be to teach men to shoot as required by the drill-book, viz., in masses, sections, or companies, as the case may be; at any rate, the results of our musketry training should be to enable men to go to the field, and act as they are taught to act in the drill-book. For this reason I should do away entirely with the figure of merit based on individual practice, and the figure of merit should be the efficiency of the battalion in field practice. It certainly is very important that men should be good shots, and I should ensure that, by various means by which we could make a man find it worth his while to train himself. The next point is the dinner hour, which is a very favourite topic with me. We were very much hampered by the dinner hour at Aldershot. Whatever we were doing, however interesting it might be, the chances were that we had to go in at one o'clock on account of the dinner hour. I have often argued that it was extremely important to have men used to fast to a certain extent, and not to expect a heavy meal until the end of the day, because certainly in a camp they could very seldom get their heavy meal until the end of the day. As regards the habits of the soldier, that he has been always used to dinner in the middle of the day, I do not think that signifies. In the first instance, it is not so certain that he has been used to a heavy meal in the middle of the day or at any other time, and in the second place, as you train the soldier's mind and train his body, I do not see why you should not train his appetite as well. My last remark is on the colour of the dress. Of course, like most soldiers, I have a great feeling for a red coat. But the arguments are very strong against red, and in many of our campaigns lately we have not dressed our men in red. I do not think after all it is a matter of such very great importance, because of course it does not so very much matter what you put outside, the matter is what you put inside the man. As long as the soldier is trained in the proper way, and has the proper spirit in him, I think it is a matter of comparative indifference how he is dressed.

General Sir C. P. BEAUCHAMP WALKER, K.C.B.: The general tenour of the whole lecture is so good that I hope that a word which Colonel Tulloch used towards the end of it has some meaning in it. They are two words, viz., "at present." I hope he will give us another lecture some day, and an equally good one. The lecture is thoroughly practical, and it points to what really and truly is at the bottom of our success in war, though we do get raps on the head sometimes. I am inclined to say that all drill is battle training. What a man wants in battle is to keep his head cool and his eyes skinned, but he should have so studied his profession that nothing can come strange to him. The great fault which I, after fifty years' service, have found amongst the Officers of the British Army is—I won't say that there is so small a proportion who really make their profession the great object of their life and of their thoughts—but that there is so large a minority who think of the Service as nothing but skittles. It is all very fine wearing a red coat, and it is all very fine having the position in society which the status of an Officer gives him wherever a regiment is quartered: but I wish there was a little more earnestness as to the profession which has been taken up. Men do not take up other professions and treat them with lightness; those who do are unsuccessful in life, absolutely unsuccessful. Then I am afraid there is a thing called a pension at the bottom of an Officer's service, which induces a man sometimes to think, "Oh, when I get out I shall have something to live upon, I shall not starve." I fancy the commercial man who did that would starve. There are two or three points which I should like to advert to. There is one sentence in which I can thoroughly back Colonel Tulloch. After some forty years' service

His Royal Highness was good enough to offer me the post of Director-General of Military Education. Those forty years had been passed almost uninterruptedly on foreign or active service, or on sharpish Staff duties at home. I suppose, therefore, I was looked upon as a person who might be easily impressed with what I had seen very little of, which was soldiering in England. I cannot tell you the mournful stories that were poured into my ear as to the way in which the Officers of the Army had deteriorated in physique since education had been insisted upon. Well, my forty years' service made me rather incredulous as to anything that was told me—in fact, the habit I have formed, after ten more years' service, is to believe nothing—but I still thought it was my business to see whether what was told me was right or wrong. Another thing that was told me was that a totally different class of men was entering the Service from those who entered it when I entered it. I made the most careful inquiries in both respects during my period of office. I saw young Officers as much as possible, the growing ones, whenever they liked to come and see me on any point whatever, and I very soon came to the conclusion that as regards physique there was nothing in the world to be said against those who were entering in that day. And further, as regards status in life, they were exactly the same class of men as entered the Service when I did so forty years earlier. Further than that, having been a keen sportsman all my life, and having formed the same opinion on the subject as is held by the lecturer, I made particular inquiry, both privately and in other ways, as to the sort of men who were coming out strongest at the Staff College. I found that with one exception, during the whole time I was in office, the men who came out at the head of the Staff College list were the hardest riders and the keenest sportsmen among them, and very often the best cricket and racquet players. This I gathered not only from inquiry from the professors, but from those at Sandhurst who were my friends, and had an opportunity of seeing these men, and from the gentlemen who were serving in my office. And I unhesitatingly back the opinion which Colonel Tulloch has laid before you to-day, that the Officers of the Army—I have been four years out of office; they may have become mere bookworms since then, but I do not believe it—that not only there was no fault to be found in the reports I have mentioned as regards those who were the hardest workers, but it also confirmed an opinion of mine, which is, that you may work the body and mind provided you give them both a fair chance. There is no doubt how very right Colonel Tulloch is in speaking of the manner in which regiments are depleted by men being taken away for every species of employment you can conceive. Really the only place where a regiment is worth having is on foreign service, where you have little or nothing of these outside duties. I most entirely and thoroughly agree with him as to the point which he has put forward as to Officers being assembled by their Commanding Officers and, I won't say lectured—everybody hates the name of lecture—but discussions being held on points, and the Commanding Officer explaining to them the reason why, I won't say certain manœuvres, but certain dispositions of the troops, are made. It is a most excellent plan; I have seen it done, and I know how thoroughly well it answers. Having served as Assistant Quartermaster-General in more than one of our districts at home, I can back what Colonel Tulloch has said about the sketches sent in after the marching out days of winter, and I can also say the same thing has occurred to me. I generally found the pretty pictures were the most incorrect, and the roughest sketches were those very often that had the most value. I saw a particular instance of that the other day in the Geographical Society, and that was a series of rough sketches sent home by a gentleman from the Congo, which had no embellishment of any sort or kind, but they were, when looked over, found to be some of the most valuable sketches that had been sent to the Society for a very long time. Colonel Tulloch has also spoken of the comparison between our training of young soldiers and the Prussian. I can only recommend to everybody who is a member of this Institution to look at a paper in the last number of the Journal,¹ which came out two or three days ago, which gives a most admirably careful detail of the manner in which

¹ No. 147, page 255 *et seq.*

every hour, we may say every minute, of the day is utilized in company instruction in Prussia. Experience of hot climates has shown that men who are well fed and properly clothed can stand work in the sun and be in better health than when shut up in barracks. In the very small experience I had of India I passed three weeks of my life on the Nepal frontier, commanding a small column with which two squadrons of my own regiment were serving. We were out till the first week in June, always on the move, and working a great deal more in the sun than probably would have been recommended if one had been lying in barracks. There were nearly 300 men in the two squadrons, and my whole sick list during that time never exceeded five men, pretty well proving that after all it is not the sun, but it is the beer. I took a very simple method of stopping any extraneous drinks beyond what was served out to them, because in the first village in which I found that drink was being sold I sent a man in to announce that if another pot of drink was sold to any soldier in my column I would kill a cow in the marketplace. The result was I never had any more trouble. I beg to bear my humble testimony to the value of Colonel Tulloch's lecture.

Colonel CARDEW, 2nd Battalion South Lancashire Regiment: I should like within the limit of time allowed to touch lightly upon one or two points of Colonel Tulloch's most admirable lecture. I think with regard to the qualifications of Officers entering the Army, that it is very desirable that they should learn surveying and elementary field fortification before entering, because in my experience I have found there is much waste of time in teaching these subjects afterwards. I think we should not be called upon to teach Officers when they are in the Army these theoretical subjects, which they ought to know before they come in. For instance, I have always noticed that the Officers from Sandhurst are much more useful when they are called upon to do reconnaissance sketches and other things connected with that nature of work, because they have had previous instruction. And I would advocate that militia Officers should also, before joining battalions, be sent to certain military schools for the purpose of learning these elementary subjects. With respect to those Officers who have passed through the ranks,¹ I have found the experience gained by them so valuable that I consider such candidates for commissions should be encouraged, but of course before obtaining these commissions they should pass the necessary educational tests, and also a course of surveying and field fortification as other candidates. I think that Officers being struck off duty for garrison classes is a great mistake. Candidates for the Staff College are not so privileged. I know when I came home from India once with one year's leave, and announced my intention to the Adjutant-General to go to the Staff College, my leave was cancelled altogether, and I do not see why Officers who have to pass for promotion should not do it in their leisure time instead of being struck off duty for the purpose. I quite agree with Colonel Tulloch that we have an insufficiency of manœuvring ground, and the few manœuvring grounds we have are not always taken advantage of. Now I come to that other point with regard to the number of men taken off from duties of various kinds. I think more scrutiny should be exercised in detailing working and fatigue parties; too many men are often detailed for such duties. I know I was an offender myself when on the Staff, and did not always consider, as I should have done, the number of men that would be actually necessary for the work in hand. One sometimes sees from six to ten men detailed for the purpose of cleaning out chapels and churches, regimental institutions which I am certain an old charwoman could do much better and more thoroughly. Another thing I deprecate is that so many men should be taken away for engineering works. The soldier of the present day is a far different animal to what he was before; he is now more scientific in every sense; he wants more instruction, and to be carefully trained; therefore his time should not be taken up more than actually necessary by fatigue duties and working parties. In a garrison station I was at not long ago, I found that one quarter of my men were on garrison and regimental employ daily, exclusive of guards and piquets. The consequence was

¹ I refer to sons of gentlemen who, either from want of means or want of application to study, have not been able to pass the examination for a commission.—T. C.

there were very few men at any time on parade. The employment of soldiers on engineering works is a matter for the Treasury, but it seems false economy to use such valuable material as the soldier, whose whole time is required in learning his duties, when such work could be done by men of the Reserve and by civilian labour. The result of employing soldiers is that they are away for weeks and months at a time from their duties, and by the time they come back have forgotten nearly all that they were ever taught. In fact it seems to me that sometimes the infantry are made mere "hewers of wood and drawers of water" for the various Departments of the Service. I do not know whether other Commanding Officers have it in their battalions—I understand it does obtain in some—but I had it in the one I had the honour of commanding, that is the section system carried out in its entirety. I mean by this that system under which the non-commissioned officers and men of a section are always grouped together, not only in barracks but on parade and in the field. It is most important that the non-commissioned officers should not be transferred from their sections except when absolutely necessary. In the battalion I commanded, the sections fell in for parade on their private parade, were inspected by their section commanders, then formed companies and were inspected by the Officers commanding companies. In that way authority was delegated to the lowest rank; the men were always kept together and could work together. But the plan which obtains in garrisons, under which so many men are used for working parties and fatigues, militates against the proper working of the section system. Owing to this cause, sections are frequently represented by only one or two files; often even a company is only so represented, and in rare instances I have even known a battalion to dwindle down to this number. The musketry rosters were kept by sections, so that the men went through their musketry course together; they were never separated, and a proper emulation was encouraged thereby between sections. The duty roster was also carried out by sections, and the men of a section went on duty together; this often enabled the other sections to be kept intact. I think the sections might with advantage be left intact on parade instead of being broken up, as they usually are; for instance, if a company has one or two sections on duty, it might be drilled and manoeuvred with the remaining sections, on the same principle as a battalion is drilled, irrespective of the actual number of companies forming it. Colonel Tulloch has informed me that on certain parades he never broke up or equalized the sections, but, no matter how small their strength was, he used them as units. An immense advantage is gained, because you are in a position to give the section commanders practice in fire tactics and discipline, which is so necessary. The system of falling in on parade by sections under the non-commissioned officers does away with the Staff parade, except for the band and the drummers. I think it is an anomaly for the Adjutant to inspect the non-commissioned officers of companies. The Officers commanding companies are the persons responsible for their non-commissioned officers in every respect. By the Queen's Regulations the Commanding Officer is supposed to command on the principal parade of the day, and to ensure that all other parades are commanded by either the second in command or by a field Officer. I think this is a great step in the right direction: I carried it out in my battalion, and in consequence all Adjutant's parades were done away with. I think this is the right principle. The Officers commanding companies should be held responsible for the men in all respects including instruction in drill. I did not find the omission of Adjutant's drills detrimental to the battalion. At first it may have suffered a little in smartness, but by-and-by, when the Officers found they had thrust on them the responsibility for the efficiency of the men, they rose to the occasion and did very well. The Adjutant performs his legitimate duties, which are those of Staff Officer to the Commanding Officer.

Colonel TONGUE, Commandant, School of Musketry, Hythe: I should like to say a few words with regard to the musketry training. Before doing so I wish to thank Officers and yourself, Sir, most heartily for the very kind manner in which you have borne testimony to the work done by myself and my staff to further the practical teaching of musketry. It is intensely gratifying to us to see that our labours have not been in vain, for of late years I may say that musketry instruction generally has had a new birth. That is first of all due to the

Adjutant-General Lord Wolseley, who got us the ammunition, and next to those General Officers and Commanding Officers who have pushed it to the front, and will, I trust, keep it there. I must not forget the Assistant Adjutant who has been appointed within the last year. He has been doing right good work, and I feel sure that what he has been doing for recruits will be felt among the trained soldiers of the battalion. I will first of all touch on the question that Colonel Tulloch raised in connection with the training of recruits at the depôts. I may say that I do not think this is quite possible for two reasons. First of all there is no accommodation at the depôts, and, again, there is a deficiency of ranges. There are very few depôts at which there are suitable ranges to carry out instruction thoroughly. Then, again, at those depôts where the instruction is now carried out, it is not so satisfactorily performed as it is in the battalion. I am in a position to tell you this because all the Returns have to come to me, and I know as a matter of fact that it is so. The next point is with regard to the publication of the figures of merit of the range practices being detrimental to field firing. I am afraid I cannot agree with the lecturer on this point, because I think it is very useful publishing the figures of merit. It creates emulation between the battalions and the brigades; besides you must have a figure of merit of some sort to enable the General Officer Commanding to gauge the musketry efficiency of the battalions under him. With regard to publishing a figure of merit for field firing, it is quite impossible because there are so many varying conditions connected with the performance of that most excellent practice as to make it utterly impossible to compare that of one regiment with that of another. There are the dispositions and the number of the dummy figures representing the enemy; then, again, we have the nature of the country over which you operate, and, thirdly, there is the distance, whether short or long, at which the majority of the rounds are fired. All these things would have to be taken into consideration. Then with regard to aiming and judging distance drills. These monthly drills which Colonel Tulloch complains of not being performed properly, I would say are entirely in the hands of Colonels commanding battalions. It is laid down in our very excellent book on musketry instructions that these drills are to be carried out most carefully. Then again he said it was a pity that good shots were not exempted from them. I should like to call attention to the Regulations in which he will see that the Commanding Officer has the power to exempt all marksmen and first-class shots from these drills. The next thing we come to is that all Officers should be put through a course of drill and practice with the Service revolver. I think it is most important that that should be so, and I may say that more than eighteen months ago I strongly recommended this to the Adjutant-General. He quite agreed with my proposition, but there was the money question which cropped up. It would cost 153*l.* only to put every Officer at home and in the Colonies through a course of practice annually with the Service revolver, and the money was refused. I may say with regard to Hythe, and what we do there, that every sergeant and every Officer who goes there—a matter of about 800 every year—is thoroughly instructed in the drill and practice of the Service revolver. That has been going on for the last two years. Now we come to young Officers and sergeants being taught how to give words of command. I entirely agree with Colonel Tulloch that it is of the utmost importance. I established a drill in which every Officer and every sergeant is taught how to convey fire words of command to their sections. I have them formed up in the barrack-square a sufficient distance off, so that they must make themselves heard, and then the instruction goes on. *Everything* depends upon the deliberate manner in which the word of command is given, the emphasis given to the different syllables, the stress laid upon and the pauses made after the preparatory word, and the decision of the final word. The great point after all is with regard to field firing. Upon that I entirely agree with every word that has been said both by Colonel Tulloch and General Smith. I know how much General Smith has interested himself in this matter. I ask him to remember a certain conference held at Aldershot at the invitation of Sir Evelyn Wood not very long ago, in which I think our opinions were entirely in accord. I am quite of opinion that undue importance is given to individual range practice. But we have a book of Regulations, and these Regulations I am afraid we must go by. It is very difficult to upset old traditions. There were many old Officers

who attended that conference who disagreed with me, and I may say disagreed with General Smith, that it was preposterous to think for one moment of reducing the number of rounds in the individual firing and adding them to the field practice. Still, I am entirely of opinion that it should be so. I recommended it to the Adjutant-General some time ago, and I live in hopes of seeing it carried out some day. I look at the individual firing as nothing more nor less than the a, b, c of the thing, it is, in fact, a preparatory practice. It teaches the soldier the sighting of his rifle, its power shows him that if he only holds it straight it will hit, and as a preparation for the more important field practice. To bring the field practice to the front is my aim. I won't say it is the aim of the whole of my staff, for one of them disagrees with me; but at any rate most of them are of that way of thinking. I cannot but respect the opinion of the one dissentient. I have got the thin edge of the wedge in with regard to bringing the field practice to the front, and I am going to push that wedge in as hard as I can.

Colonel Sir LUMLEY GRAHAM, Bart.: Like those who have already spoken, I have great admiration to express for the lecture we have heard. I think it is a most practical and soldier-like lecture, and it not only pleases me on account of what the lecturer said, showing what I think is the very good view he takes of the subject, but it also pleases me in this way, that I see what improvements have been made by our Army of late years, though there are plenty that remain to be made, in the training of Officers. When I think of the days when I joined the Army and of the little training, I may say no training, that Officers got—no battle-training—we only had training in parade work—I see there has been a wonderful change for the better, though it has not yet gone far enough. I think that every word that has been spoken to-day shows that we are on the right road, and that we are fast going towards that perfection which we hope to attain. I cannot see anything in this lecture that I could disagree with. I feel strongly in favour of some of the points that have been urged by Colonel Tulloch, and I have on former occasions spoken about some of them in this hall. There is only one thing that I wish to complain of, and that is about something that Colonel Tulloch has left unsaid, something that a subsequent speaker, Colonel Cardew, alluded to, and that is company-training. I venture to think that Colonel Tulloch rather neglects that. Now it seems to me that company-training is the very foundation of everything that follows; that if your companies are not trained, and above all your company Officers are not trained to what they will have to do in war, it becomes very hard work indeed for the Commanding Officer to train them; in fact, he never will be able to train them properly. I think that this company-training is an all-important thing, and it is recognized as such by the greatest military nation of the day. I know that a difficulty with regard to this company-training arises from the organization of our infantry, and I must express an opinion that I have expressed before, and which I have heard several other Officers express in this theatre, that till we take to the system of strong companies, double companies, in fact permanent double companies, we cannot have that efficient company-training that we hope for. Colonel Cardew spoke very wisely of the necessity of keeping up our sections, what we used to call our squads, and keeping those sections or squads always distinct, both in the barracks, in the field, and on parade. Well, under our present system this is an impossibility with battalions on a low establishment, particularly if they are drawn upon in the way which has been described so vividly, for various outside purposes. If instead of having eight companies in the battalion we have four, at any rate we double the size of our company and of its component parts, and thereby we materially increase the opportunities of our Captains for instructing their companies and for educating themselves as commanders. At the same time I do not wish to do what the lecturer deprecated in referring to this question. I do not wish to reduce the number of Officers. I should not for a moment do that. I say if you have a strong Prussian company, let us have a Major commanding, a Captain second in command, and four subalterns. That is the sort of company I should wish to have, with double the establishment of non-commissioned officers and privates that we have now. I do not wish to economize except by increased efficiency, which is real economy. I will say no more about that. I would just advert to the question of the colour of the clothes which has been alluded to. It appears to me that the exces-

sive visibility of the red coat is not an unmixed evil in war; it is a great thing to be able to distinguish friends from enemies. I, in my little war experience, have seen cases where it was not easy to know which was the enemy and which was the friend. At the Battle of the Alma, particularly, I remember two cases where the General in command of the brigade that I was attached to (I was his Aide-de-Camp) sent me with orders to the Captain of a battery to open fire on a column that was retreating up the hill. I took the order; the Captain said, "Those are not Russians, those are Frenchmen." We had the Frenchmen just on our right; both they and the Russians were dressed in greyish great coats, and at a little distance they were not easily distinguishable from one another. I was sent a second time with the order; "Oh," the Captain repeated, "they are not Russians, they are Frenchmen;" and the column, which was Russians, got away out of range before their identity was established. The same thing happened at the end of the battle when we got on the heights of the Alma after having captured the position. There were the Russian infantry retiring over the plateau, and one of our field batteries galloped up. My General said, "Don't you see those Russians, fire at them." "Oh," says the Captain, "they are Frenchmen." "No," says the General, "they are Russians," and he used rather strong language too. It ended by the same thing happening as before, and the question was not settled till the Russians had got out of range.¹ That was to me a lesson that a distinctive dress is a great advantage in war. With regard to the colour, after all the white pipe-clayed belts and white pouches that we wear and white helmet covers catch the eye more than the red coat. The red coat at a distance is not nearly so visible as the rifleman's green in certain situations.² The last question I will touch upon is with regard to the colours. I feel very strongly what the lecturer said about having one colour restored to battalions in war-time. I think it is a very poor thing indeed depriving the British Army of its colours, as if we were not able to take care of them, were, in fact, afraid of losing them. I think it would have a very bad moral effect, and though I know there have been instances in which colours have brought loss to battalions from the concentration of fire on certain points, yet on the other hand the colours have been the occasion of very valiant deeds, because of the superstition about them which the French call the worship of the colour. It is a superstition if you like, but a superstition which should be kept up as it excites men to great deeds. Therefore, I hope that Colonel Tulloch's idea will be followed, and that one colour will be restored to each battalion on service, at any rate if engaged against the Army of a civilized nation.

Major WALKER, R.E.: It is with very great diffidence indeed that I enter upon any discussion of this paper, but there are some few points that the lecturer has touched upon that I thought that I might allude to. The first point is where the lecturer, after calling attention to the great value of a steady drill, goes on to say something more is necessary, and that we do not get beyond this necessary foundation of steady drill, and he speaks very justly of the want of ground in very many cases for very extended manœuvres. I think he also draws attention to a point of very great value, and that is that there is a good deal of War Department ground that exists in many places that is not made use of, because it is thrown away by being leased for small sums for farming purposes, and that using that ground for military purposes would cost appreciably nothing to the country, and would be of the greatest advantage to the Service. That is a point that I think ought to be very strongly pressed. Then there is some question of education to which I may fairly allude, for it has been my fortune to have had a good deal to do with education at

¹ A few days later I saw one of our field batteries near Sevastopol, unlimber, and all but open fire upon a body of French troops who were at first mistaken for Russians.

² Years ago, in Kafirland, I had frequent opportunities of comparing the visibility of the red coat with that of the green jacket, and almost always found the latter caught the eye more than the former. This does not, however, apply in the same degree to the scarlet tunic now in use, which is more striking than the brickdust-red.

one time and another, and I know something about it. With regard to the special value of the instruction at Sandhurst being its practical nature, I think a little too much has been made of the practical nature of this instruction. I think when you take a lot of young men out and get them to dig at a shelter-trench in such easy soil as Sandhurst they look upon it rather as a lark. I do not think it is a good instruction, although a great deal of time is wasted over it. The practical instruction should come later. I do not think they are quite able to appreciate the value of it. It has been my fate also to know something of what the Officers of the Army know of field fortification later in life, and I find that the men who have had this practical instruction at Sandhurst end, in a very large majority of cases, by not knowing the shelter-trench exercise, showing that it has not made a deep impression upon them. I think that that kind of instruction is very much better given in a model shed. If you have a model shed, as we have at some of our military colleges, where all these things are modelled in sand to about a quarter the full size, the instruction is really very much better. The lecturer has alluded to the militia Officers who have passed the competitive examination, their knowledge being of a most parrot-like description. With that I perfectly agree. The reason is, it is a book examination altogether, and there is a great deal to be said on that point. Our examinations are a great deal too bookish: that is a point to which attention cannot be too much drawn. Then he says, with reference to retired Officers teaching in the School for Militia Officers at Aldershot, "Well qualified retired Officers, who would only be too glad of the employment." But, I think, if you are to have instruction in any branch of the Service you must have Officers in fresh and fresh, and the Officers who are actually in the Service, and have to go back to the Service, are the men who will make the best instructors. I think if you put it in the hands of men who have left the Service it is likely to get into a groove, and not to be quite up to date. The most valuable point, if I may be allowed to give any opinion, in the whole lecture is where the lecturer points out the great value of the Commanding Officer himself pointing out all the mistakes made, and asking the young Officers questions, in fact conducting a tactical instruction. That is a point in which I venture to think that we altogether, or to a very large extent, fail. It is the real point of the whole matter, that unless sufficient interest is taken in the subject of drill, and unless it is made a subject of direct instruction by Commanding Officers, the younger Officers will not take any interest in it. If it is made a subject of direct instruction and inspection, and if it is known that the Officer who pays attention, and who answers well, and shows a knowledge of his profession in these conferences, as some call them, will be brought forward, the feeling of the Officers will change very much about instruction, and they will do what Sir Beauchamp Walker says is so necessary, they will become more professional. What we want is to have professional Officers whose business it is to be soldiers, and whose business it is to fight. There is another point, in which Colonel Tulloch says the Officers should come forward to lecture in garrisons, Officers who have special knowledge of special subjects should come forward and lecture. I think it would be very valuable, but it needs encouragement. If Officers found that instruction was asked for on a special subject, I am sure they would be only too glad to give it, but it is a thing which is, I think, discouraged rather than encouraged. There is another thing, about working in the sun. A very marked illustration of that occurred with respect to the condition of the English and French troops in the West Indies; the Frenchmen worked their troops out in the sun making the roads, we cooped our men up in the barracks; the consequence is, in Martinique they have the most splendid roads of any country, and they were all made by the soldiers, while the British West Indian islands have no roads at all, and the soldiers are very much better in every way if worked in the sun. I can speak from personal experience, having worked hard in the sun years ago in India: it is the healthiest life you can possibly lead in a hot climate to be in the sun if you are working hard. One other subject which I would mention with the deepest humility, is that any reform that is to come in the way of better instruction of the Officers, must come from above, and in this way: I think that if the Officers are to become more professional, if they are to be as Colonel Tulloch wishes, better instructed in their duties as soldiers, apart from parade duties, that can only

be enforced by the inspection being made more real. I had spent a good many years on the Staff as Captain, and I came back to the garrison in England to join a company to pass my examinations for promotion, and during that time I had some inspections, and I venture to think that inspections are not practical in the sense that Colonel Tulloch wants, that what is asked of Officers is not to know their profession, but only its minor details, and until the Officers are asked, and it is the business of the inspecting Officer to see that the Officers do know their profession, so long the result will not be satisfactory.

Major THOMAS, Manchester Regiment : Colonel Tulloch has forcibly called attention to the great evil of withdrawing a great number of soldiers from their legitimate duties and placing them on fatigues. There is another evil of the same nature, though not of so great a magnitude, and that is the withdrawal of Officers from their professional duties to serve on Boards, Committees, and other works which have nothing to do with the duties of a soldier. I have only just come back from India, and there the evil is one of very great proportions. The number of days that Officers in India are taken away from their parades and other works to sit on Boards and Committees is very great ; I myself have been on Committees of all sorts, on subjects which I really could not be expected to know anything about. Not long ago I was ordered to be President of a Committee to decide on the quality of a carpet ordered for the Viceroy's Camp. It was the duty of the ordnance Officer to provide these things : an Officer of artillery objected to the quality of the carpet. I went up and said, "My education in æsthetics has been sadly neglected : I can only promise to be a judge of fact, and not of the quality of this carpet." There was a dispute as to the colours, whether they were too bright or too subdued. That is one instance of the way in which we are taken away from our proper work, and a great deal of that sort of thing occurs in India. Another point referred to is that of judging distances. I speak with great deference on this matter, as there is present here to-day the Head of the Musketry School ; but it strikes me at the present day that with the very flat trajectory of the rifle judging distances is almost unnecessary, and certainly the time now wasted upon that might be saved for other instruction. I think it is only necessary that Officers and non-commissioned officers should know and be taught to judge distances, especially as in action we are told we should always inform the men at what range they are supposed to be firing, so that perhaps judging distances in the future will be unnecessary for the great mass of the Army. With regard to revolver practice, apparently the lecturer does not know that in India for the last two years all infantry Officers have been compelled to go through a course of revolver practice. The money difficulty has been got over by an order from the Commander-in-Chief, directing us to pay for the ammunition ourselves, but as the cost is very small there is no objection on that account. The first practice I attended I looked upon as one involving a considerable amount of danger. Officers produce all sorts and conditions of weapons, and it would be a good plan if we were all obliged to have one of the same pattern.

Captain WALTER ADYE, Royal Irish Rifles : I wish to make a few remarks with regard to the actual field training of our Officers and men. It has been referred to by several distinguished Officers, and amongst them the late Director-General of Military Education. I want first of all, with regard to the training of Officers and men, to refer to one of the most important remarks made this evening, I think by Major Walker, Royal Engineers, and that is as to the system of inspection. In our practical training there are three important factors which require careful attention and simplification. Those three factors are, first of all that the training of men and Officers should be guided by that leading principle of fixing the responsibility. I think it was especially referred to by Colonel Cardew, and also by Sir Lumley Graham, that the company should be not only a fighting unit but a school unit, where the entire training of the man should be carried out ; but somebody, be it Captain or subaltern, should be wholly and entirely responsible for it, and his future career should largely depend on the result he produces. The next point with regard to the training of men and Officers, not only for the sake of the responsibility for the efficient battle training of the men, but also of the recruits in the regiment who come from the dépôt ; there seems to be a sort of dual control, and the standard of efficiency is not defined. When I was in my regiment—I have

been seconded in my regiment for the last four years—but when I was with my regiment, and was for some years commanding a company as a subaltern, I found the greatest difficulty in ascertaining who was responsible for the proper training of recruits. There was no fixed quantity or standard of efficiency laid down; they all came there with various documents and Returns, but it was never understood what point they had reached in their field training; one always knew what they had done in musketry, but no one knew how far they had got in battle or field training. That was one of the greatest difficulties we experienced as subaltern Officers, when these men came to the battalion and were handed over to the company from the Adjutant. There is no school recognized either in the company, or in the battalion, or at the dépôt, and the question comes, who is responsible for the recruits' progressive training? Then there is another point which has been referred to, namely, the system of inspection. Of course inspection solely and entirely regulates the practice. As Major Walker said, the whole practical, theoretical instruction of Officers and men entirely depends on the nature of the inspection; whether he be a man or an Officer, he is guided in his energy, or his zeal, or his apathy, as the case may be, by what he expects to have to do at the inspection. The Officer is always working up for inspection, and when inspection arrives he finds nothing more nor less than a test in the elementary part of training, or a great deal of it (not in every case), but at inspection he finds he is examined in nothing else, but simply company and barrack-square drill. I think that is a great point to bear in mind. Colonel Tulloch said a great deal with regard to the examination of militia Officers, and also Officers of the regulars, for promotion. I should like to say one word with regard to the examination of Officers in the Army for promotion. I think the tactical and other theoretical papers in fortification and topography should be not only far more simplified, but be made a far more practical test of a man's knowledge than they are. With regard to tactics, it would be more satisfactory, and far more practical, if an Officer were set a few simple problems which had to be worked out on a map, instead of being asked ten or twenty questions based on a text-book. Anybody can get hold of a tactical book, all he has to do is to commit to memory something like fifty or sixty different rules; he can do that in the course of a few hours, and after that he can pass almost any examination paper put before him, but that is no practical test whatever. One thing regarding a point indicated by Colonel Lonsdale Hale, when he gave, a few weeks ago, a lecture here on "The German Drill Regulations." He was telling us that in his time, when he was Garrison Instructor, and subsequently the examiner to set the papers for Officers' examinations, he had the easiest possible task to pluck any Officer by giving him general questions. All Officers could answer rule of thumb questions, but few could apply general principles to any given combination of circumstances.¹

Brigadier-General the Right Hon. J. H. MACDONALD, C.B.: Mr. Chairman, ladies and gentlemen, as an Officer of volunteers, I have listened with as great satisfaction, if not greater, than that with which any Army Officer can have listened to the instructive lecture we have had from Colonel Tulloch. There are one or two

¹ The well-known "Letters on Artillery, Infantry, and Cavalry," translated from the German by Colonel Walford, R.A., give an excellent idea of the method of effectively inspecting a body of Officers and men in battle training. In the drill examination of Officers which precedes the paper test, the same unpractical method is noticed. Officers are examined in extended order movements, advanced guards, outposts, &c., but, in nine cases out of ten, the test is carried out with a handful of men in the confined limits of a barrack-square. Yet the certificates given represent the successful candidates as being capable of leading men in the field. As regards musketry training, the inspections might with advantage be made more searching. What is wanted is a good all-round average in the field or military shooting. The word "score" has been considered the objective, instead of the word "war." Once a man has been well grounded in the use and knowledge of his rifle by steady shooting at a fixed target and known distances, he should then be practised in nothing but field practices under military conditions, and frequently accoutred in a complete Service kit.—W. A.

points on which I should like to say a few words from a volunteer point of view. If the battle training of Officers is to be efficient, the first step you must take is to find out what it is you are going to make them do with their men, and how the men are to be organized. It seems to me that several matters must be dealt with in that view: first, you must carry out the reform which Colonel Cardew has suggested, viz., the reduction of the unit, making it a real unit for work. You may give Officers any instructions you please, but they will never be able under present arrangements to carry them out. With the system that you now have of organization for battle, it is absolutely essential that there should be individual action controlled by grouping. I think it is absolutely necessary that you should organize down, even lower than a section, into groups, which shall be small groups consisting of a fixed number of men, and not a large uncertain group, like sections, which may vary one day with another in the same regiment, and vary with the strength of the regiment, because your section one day may be twenty-four men, and another day it may be only eighteen men. Working by sections you do not get a working group at all, because a working group should consist of an exact and unchanging number of men at all times. And the group ought not to be, as the section is, a practically separate command, but only a few men who are under the charge of one of their number who has not to command the men, but to aid them in working out the command of the superior. He has to see that this group as a part of the organization of a section or company should be as far as possible prevented from losing itself, and the men prevented from falling out of their connectedness and getting into confusion. Until we recognize that principle, I think every Commanding Officer will feel that he cannot launch his men, even in peace-time, over a rough, broken, or wood-covered piece of ground without being subjected to the unfair criticism upon their drill and discipline of persons who are looking on, both professional and others. For it is only by having some such grouping system that you can ever carry out rapid, organized advance, and rally quickly from the confusion of the climax into the safety of orderly form. Then there is another matter, which I think is of the greatest possible importance, which is, that in training we should not perpetually follow the system of wearily grinding at one thing for a considerable time, and then dropping that altogether and beginning to train at something else, but that the instruction of a man who enters the Army or the volunteers should be like the training for every other practical or educational work in this world. After he has had sufficient preliminary drill to know how to move about, this instruction should be interspersed, that is to say, his parade or stiff-style instruction and his what may be called *action* or free-style instruction, should be made to dovetail into one another. The parade stiffness of form and dressing should be used as the best means of rallying out of the necessary loss of exact form which will occur in proper action instruction. The men should feel that the parade training, which should of course be careful and accurate, is only to lead up to the action training, in which the mere accuracy of external form is made subordinate, and the real work—for which the parade was a preparation—is entered upon. The action training will then not be a distracting and disturbing exercise, but will be consistent with the fact that the men must be kept in order on all occasions when they are engaged in the field, and recovered into form as soon as possible when the unavoidable loss of form in action exercise has occurred. I am quite sure that if you could establish the principle that during every drill the men should be alternately taken from parade drill to action drill, and from action drill back to parade drill, at intervals of say twenty minutes, the men would be more interested in both drills, and you would have extraordinary power of restoring them from confusion to order, rallying them from the shakiness which is induced by their being compelled to go on rough ground and being exercised in a rougher manner. You would have much more power than you have according to the system which has been followed in my experience in this country for a great many years. At present men are kept for months and months performing figures in barrack-yards, and are then carried off to some place where there is a considerable amount of broken ground. Parade work ceases, and a separate system begins. If in contrast to this you were to adopt a system of training in which both styles were combined, you would not hear again that extraordinary observation made so often by Army Officers when men are taken out for practical exercise at Aldershot or

Salisbury Plain, and which I have over and over again heard myself, that it would take them six weeks to get the men brought back to a state of discipline after the way in which they had been knocked about in field work. There must be something seriously wrong in system, if the practical application of instruction strikes a blow at discipline. There is one other matter to which I should like to refer, and that is this, that all our drill-shed or barrack-yard drill, all our drill with markers out, dressing on points, &c., seems to me never to have any relation whatever to the business to which all drill should apply, particularly in modern times, that is to train men into that second nature which shall enable them to use their weapons to the best effect. I look upon it now as an essential part of fire discipline that men should never be got out with arms in their hands on parade *on any occasion* without its being part of the business of the day that their Officers and sergeants should during their hours of drill repeatedly and over and over again put them through the motions of firing by order. Habit is a powerful thing, and when men have been accustomed to bring their rifles to the shoulder, after adjusting the sights according to order, and take steady aim, if they have done that thousands and thousands of times, they will certainly be steadier men when they come to do it under the more exciting circumstances of an engagement, than if it has been entirely ignored at drill. What is the fact? I am under the correction of the military Officers here when I ask if such a thing is ever done in barrack-yard drill. I will give you an instance. I went to the Wellington Barracks for the purpose of learning what I ought to teach my men, and how to teach them. During the whole time I was there on no single occasion were we directed to put those under the command through the motions of firing at all. It seems to me that is just simply turning the barrack-yard into a place in which Officers are to learn how to move men about, and how to make them stand in an exactly straight line, but it does not impress upon the mind of the Officer the importance of seeing that his men shall be put through the motions of firing in a disciplined manner, and taught, by the habit of perpetually doing so, to fire in a disciplined manner. If there was a strict order issued that on no occasion were men to be drilled with arms in their hands without their being from time to time brought to the firing position and put through the motions of firing correctly, it would be of the greatest possible benefit to fire discipline. One word about inspection. The volunteers have always felt what has been stated in this theatre on many occasions, and expressed again to-day, that it is the inspection which settles what the previous drill will be. I know myself during the last year, having had the honour of being appointed Commander of a brigade in my own country, that on more than one occasion when I have asked a Colonel whether he would not give up practising the march past, saluting and so on, and devote more time to action exercises, I have been told, "Oh, Sir, when the Inspecting Officer comes round he will expect us to begin with march past in column, and all our Officers to salute very correctly, and if we do not practise this we shall not get our Capitation Grant."¹ In my own particular case with my own regiment, we this year escaped from this bugbear. We were inspected last Saturday, and on that occasion our inspection consisted of our receiving the Inspecting Officer. The whole brigade consisting of three battalions was then put through the attack, every Officer who had duty to do being called upon to describe to his men what he wanted to do and how it was to be carried out. At the end of that practical piece of work we marched past once in quarter-column at the trail, and that was our whole inspection—the first practical inspection I had ever gone through since I became a volunteer.

¹ This question of inspection is at the root of the whole matter. No greater mistake was ever made than the reintroduction of the salute by Officers in front of their companies in the march past, after march past in slow time was abolished. This necessarily results in a large amount of time being wasted in marching past the men in order to practise the Officers in saluting. The marching past should be restricted to one march in column or quarter-column, according to circumstances, that the Inspecting Officer may see the men. All beyond this is a waste of time under modern conditions, and leads to great waste of time in preparation.—J. H. A. M.

I am most grateful to our Officer commanding the regimental district for allowing such an inspection, and I earnestly hope his example will be followed.

Lieutenant-Colonel HERBERT (Grenadier Guards), Military Attaché in St. Petersburg: I will not delay you beyond a very few minutes, but I wish to say a few words drawn from my recent experiences in Russia in support of what has been said by several speakers, that everything in the training of the soldier is dependent on the inspection. I happened to be travelling with a Russian General a short time ago, who was making a tour of inspection. We arrived in the evening at a station where the train stopped for dinner, and in the neighbouring town was quartered a regiment which my friend had to inspect. When we got there the first person we saw was the Colonel commanding the regiment. The General seemed annoyed, and said to me, making use of a very strong expression, "Now he knows I am about here, my little plans will have to be altered." He explained to me that he did not wish it ever to be known when he was coming to inspect. We got into the train again and continued our journey. About a week afterwards the General came back to the same place, arriving about three in the morning. Then he started off and ordered out a company of that regiment for practical work in the field. They were paraded within an hour after the time he arrived. There is perhaps more necessity in that country for keeping one's movements entirely secret than in England, but there is no doubt it is an extremely practical way of testing the efficiency of troops. There is no chance of "*getting up*" anything beforehand, none of the swabbing of barrack-rooms, and getting things all in order, the best clothes out, and all the rest of it: the men were taken out straight away and put through the most complete tests of their battle training. Of course there is a difficulty arising in this country with regard to the quarters of the troops. We know that here practical work cannot be done very often; there is no ground available where a General can put troops to a proper test in that way, but still I think something might be done in the way of separating the inspection of troops with regard to their training, from the inspection on parade, the inspection of barracks, and interior economy, and other things which are no doubt extremely necessary for efficiency. I felt called upon when General Macdonald was speaking, to get up in defence of an institution which he attacked, though I believe very good-naturedly, that is, the School of Instruction for Reserve Forces at Wellington Barracks, with which I was formerly connected. There I say the fault that he complains of, if it be a fault, is exactly the same in origin as that already alluded to. We work there—I speak as an ex-Commandant of that School—we work there for the test required from the volunteers. We do not want to train our men: they are already perfectly trained. The men are brought out simply as machines to be operated upon by a lot of Officers, who have to learn up a certain amount of drill. We did our best to teach them what they would have to do when they came to be examined. I fully agree with many of General Macdonald's remarks, and merely wish to make this statement in defence of the efficiency of that School, and I think most volunteer Officers who have been there will bear me out in saying that it is efficient.

General MACDONALD: I did not wish to attack the efficiency of the School; all that I objected to was that volunteer Officers should never be instructed to put the men through the motions of firing when they had them on parade, and thereby be led to think that firing exercise was of no consequence.

Colonel TULLOCH (in reply): With regard to Sandhurst and discipline, I have not found any difficulty amongst young Officers at all. Some had a few odd ideas when they first came, but they got rid of most of them after being there for forty-eight hours, and there were none who were not in perfect order after a week's regimental life. With regard to reading maps, I think that should certainly be taught as part of a surveying course, but I cannot help saying how much I think the raised model teaches Officers to read *ground*. The first place in which I ever saw Colonel Shaw's invention was in Cairo, and there Officers of all grades took the keenest interest in the War Game. I am sure everyone of us, no matter what our experience had been, got much instruction by simply writing out the orders. I beg sincerely to thank Sir Beauchamp Walker for the very eulogistic way in which he was kind enough to speak of the lecture. It will encourage one to do more by-and-by. Colonel Cardew mentioned about sections and my having worked on the squads

or section system in my own regiment. I had the whole of the regulations for that printed and placed in the hands of every non-commissioned officer. That little pamphlet is now amongst the miscellaneous pamphlets in the library of the Institution. I also had the same thing done when I was in command of a brigade so that everyone should know exactly what I wanted. As regards the figure of merit for musketry, I certainly think we might raise to a higher standard the value of a low percentage of third-class shots. I think the effective shooting of a battalion should to a great extent be measured by the small number of men who shoot badly. In South Africa, where my men took to shooting in a most extraordinary way, paying for their own ammunition, we found there were only 5 per cent. of the whole regiment who could not be taught to shoot, and that 5 per cent. I think had defective vision. But I know this, that our field or rather battle firing exercises were so remarkable that the Boers used to come down and could hardly believe what they saw. On one occasion one of the mounted infantry subalterns with his orderly came across a party of Boers beyond the Tugela going to their new Republic. They began talking and chaffing, and just then a buck happened to turn up on the veldt. These Boers said, "Look at that buck, you say you can shoot, knock it over." The orderly got off his horse, judged the distance, went on his knee, fired, and the buck fell. The Boers would not believe the buck had been hit till they rode up to the body. When they measured this distance, it was 500 yards. The other day at Assouan, where we had two Morris tubes with which shots were occasionally got at foxes, on one occasion a man fired at a fox as it was trotting off; he missed it with the first shot, put in another cartridge, and shot the fox through the head dead at 200 yards. These were the men who had been taught in South Africa. As regards the field firing having a figure of merit, I believe the Germans have that test, and I see no reason why we should not also have the same. With reference to the revolver, I found no difficulty in making a revolver range in Kasr el Nil Barracks; revolver practice was carried out and also exercise with the Morris tube for the benefit of bad shots amongst the men. Of course the revolver practice was under very stringent regulations, because I do not know a more dangerous animal than a young gentleman when he first takes a revolver in his hand. Sir Lumley-Graham was kind enough to refer to the company being the unit. I should like very much to go into that question, because I have very strong ideas upon the subject, but as the lecture has been far too long, I dare not say any more. All I can say is with regard to the section, or squad as I prefer to call it, I always made that the tactical unit and worked it much in the same way that a gun and its detachment is worked in a battery. Living together, as the men of each squad did, they knew each other well, and would stick together under the most trying circumstances. In their barrack-rooms the men of each squad were posted up with the squad leaders, that is to say, sergeant, corporal, lance-corporal, and an old private, and at every tactical parade these men fell out in front of the squad, so that the men who were to be their leaders were impressed on them, that if the first squad leader was shot down the second was ready to take his place. Practically there were sixteen squad leaders in each company. On tactical parades each squad of a company fell in by itself, there was no equalization of members. As to the red coat: in distinguishing the other side I was very nearly coming into a collision on one occasion with our own Indian cavalry, from the enemy's dress being similar in colour to that. But one must take one's chance: in fact, on one occasion I know some sailors were very nearly firing into the marines. It was pointed out to them that they were not the enemy, some of my old shipmates rather wanted to have a shot all the same for the fun of the thing. As regards red not being a conspicuous colour or thing, why is it that in target practice the danger signal is a red flag? Because it catches the eye instantly. On the railway, red is also the danger signal for the same reason. Then, take for instance an ordinary hunt in England, look over the hunting-field, the eye catches instantly the red figures, long before even the black coats can be seen. As regards the belts, they always take the pipe-clay off them now on service; my own men the other day at Suakin had the whole of the pipe-clay washed off and the belts stained, and they really were not noticeable at all. I am very delighted to hear Major Walker support me with reference to the War Game, as regards the course at Sandhurst not being practical enough. Surely that is in the hands of the

Education Department, they should know all that is going on. All I can say is as to those men I have had from Sandhurst, they had been well taught. I used to give all the Officers regular schemes, just as is done at the Staff College, and they worked out some of those schemes in a way that would have done credit to men in the Staff College itself.

Major WALKER: I may say I have nothing to do with the Education Department. Somebody accused me of it.

Colonel TULLOCH: I certainly think they might have more practical work, and I said so in my paper.

Major WALKER: I have a connection with it: I do not belong to it.

Colonel TULLOCH: As regards what Major Thomas has said about the revolver. I may say that we bought our own ammunition in Egypt: it was not much—some small sum. I found it answer quite well; we had a good range, close to the mess room. With regard to what has been said about working up for inspection. I am afraid we all of us know that that is so. The Russian method as explained by Colonel Herbert is the proper system. As regards what Brigadier-General Macdonald has said with reference to the drill, all I can say is that it is a most intense feeling of satisfaction to an old soldier to find that the volunteers are so keen about training. I know I had a great deal to do with them in entraining and detraining troops at several big Easter Monday Reviews, and everything which the volunteers had to do did them very great credit. Their very discipline is now something marvellous. On one occasion I remember being in charge of a large station at Brighton. The men had been at work all day without refreshment, there were long refreshment bars on the platforms. The volunteers marched in. I stood well clear to see what would happen. They looked with hungry eyes on the provisions, but the whole body marched steadily up to the train. We found there was five minutes to spare, and I told the Colonel they might fall out: instantly they went at the food, like hungry wolves. When required to fall in they were all back in their places instantly. These men had not had anything since seven o'clock in the morning; when they arrived at the station it was six o'clock in the evening: the discipline of those men was I consider excellent. I had on another occasion six regiments waiting for trains coming up. The railway people had not brought them up in proper time. The men were told to sit down quiet, three regiments on one side of the long platform and six on the other, and I assure you, if a blind man had walked up that platform, with those six battalions sitting on each side, he could not have known there was a single man there, so quiet were they all. I have heard others say the same sort of thing. Then again, the keen way in which the volunteer Officers work at drill fairly startles one. It is a great satisfaction for us to see the way in which those Officers have taken to studying their volunteer profession. I do not think that I have anything more to say, except as regards what Colonel Herbert has said with regard to battle training inspection and mere parade inspection being kept separate. I think if Generals did come suddenly down upon a regiment in the present day many Commanding Officers would be only too happy to show they were always ready, but others again might prefer the present method.

The CHAIRMAN: I have on your behalf to return our thanks to Colonel Tulloch for his admirable lecture.

Friday, May 17, 1889.

ADMIRAL OF THE FLEET THE HON. SIR HENRY KEPPEL, G.C.B.,
Vice-Patron, in the Chair.

ON THE TRAINING OF THE EXECUTIVE BRANCH OF THE NAVY.

By Captain GERARD H. NOEL, R.N.

1. *General Considerations.*

THERE is a natural feeling in the Navy that naval Officers should have a voice in the decision of the types of vessels they may be some day called upon to take into action, and there is so much controversy on this subject that the still graver question of the training of Officers and men to man and fight these ships is allowed to fall into the background. The answer of an Admiral who had full confidence that those under his command were thoroughly trained to a sea life as men-of-war's-men would be: "Give us any sort of vessels, so long as they are seaworthy, and we will fight them;" in fact the training and efficiency of the personnel should be the naval Officers' first and principal care.

In September, 1885, four corvettes were commissioned for the Training Squadron, the purpose of which is to train young Officers and seamen in the practical duties of men-of-war's men at sea. In former years similar squadrons of exercise, under the less expressive but more poetical title of "Flying Squadrons," have been periodically organized and kept cruising, not, perhaps, so much with a view to the training of young seamen as to the employment of Officers and men in time of peace. The existence of these squadrons came to an end in the summer of 1882, and by many Officers it was regretfully supposed that the Navy had seen the last of them. But the Boards of Admiralty under the present Government, with wise foreknowledge of the absolute necessity for retaining in the seamen of the Fleet the attributes of a sailor, and that experience of sea-life, without which a man-of-war's man is of little practical value, determined to re-establish the squadron on a more effective system; hence the formation of the present Training Squadron.

The advocates for the abolition of all that was formerly known as seamanship, who would sweep away every stitch of canvas, and every spar that was not required for military purposes, were not pleased

with what they considered the retrograde step of re-introducing a system of training men as sailors; and so confident were some of them that seamanship was a thing of the past, that they were inclined to shut their ears to all arguments in opposition to their favourite theories, and to console themselves that such opposition must soon die a natural death. It is partly in the hope of awakening in these Officers a sense of the real situation, and of conveying to whoever may hear this paper a view of the other side of the question (for so often the condemnation of everything that is not machinery is dinned into the ears of the public), that this paper is humbly submitted for consideration.

Supposing, as it is here asserted, that the first care of a naval Officer should be the efficient training of the personnel of the Navy, let us consider how it is best carried into effect, and in doing this it is proposed to treat only of the Executive, and not to refer to the Civil departments, all of which, including that most important branch, the Engineers and stokers, are composed of specialists, only differing from their comrades in other employ through being subjected to a more rigorous discipline, and in most cases entrusted with greater responsibilities.

We have to train the naval Executive in such a manner as to make him in the highest degree capable as a man-of-war's man; how is this to be done? First, let us imagine what his duties would be in time of war.

In a naval war our ships would be constantly at sea, probably only putting into harbour for repairs or coaling. They will be frequently damaged through action with the enemy, collision, or grounding; losing anchors, davits, boats, and spars, all of which should be, as far as possible, immediately, though, perhaps, temporarily, replaced. They will frequently have to send away boats on various services, and, let us hope occasionally, parties as prize crews. Coaling, often under great difficulties and with the greatest possible celerity, will be a constant necessity. They will occasionally fight in a general or an individual action; and sometimes (when there is no danger to the ship itself) they will be required to land all available men for service ashore. They will often have to take other ships in tow, or render them assistance. Away from naval ports the Executive will have to improvise methods of removing disabled guns and replacing them with others, for the transport of heavy boats, and for innumerable minor duties with regard to the supplies required for the Fleet, all of which will have to be done with the utmost speed.

In order to accomplish these duties effectively, the general ideas for the training of the Executive may be summed up as follows:—Officers and men should be entered young (this has now been done for many years); Officers and men should have the maximum of sea experience; Officers should be constantly in charge of men, and giving orders to them, and the men should know how to obey any order they receive with alacrity; skill in handling men should be attained by the Officers, smartness and handiness be attained by the men; acute vigilance should be practised by both Officers and men,

and the power of detecting the least sign of anything going wrong; accurate observation, especially as to the appearance and movements of other ships, should be cultivated; an intelligent comprehension of what dangers are to be apprehended, and the best means of warding them off, is invaluable; a general readiness of resource, which can only be gained by experience, is most desirable; activity and fearlessness are indispensable. Thorough efficiency in boats, and on the part of the Officers in the management of their ships, is essential; and last, but not least, a thorough knowledge of the use of arms, and for the Officers in addition, a proficiency in commanding batteries, or parties of men under arms, is of very great importance, training for which should commence from the earliest entry.

Having thus sketched the principal attributes which the Executive should possess, it is proposed in this paper to point out that without the use of masted ships the requisite training is unattainable.

2. Entry and Training.

The present system of the entry of cadets and training of young Officers is satisfactory so long as the youngsters are kept up to the mark in sea-going ships. The tendency to make too much of school-work at the expense of other more important matters is to be regretted. Boat work and close attention to the duties of the ship—giving the boys responsibilities from which they gain self-reliance—and such training as will fit them eventually for the important duties of command, and those of executive Officer, should never be disregarded;* navigating and signal duties, &c., should be closely attended to—in fact, the three years of a midshipman's service before passing for Lieutenant should be more devoted to learning his duty as an Officer than to anything else. At present, by a wise provision, the last year or six months of this time is usually passed in the Training Squadron. More elaborate instruction in steam, and actual work in the engine-room and stoke-hold, have recently been ordered for young Officers; this, no doubt, will have a beneficial effect, both in giving the Executive a better knowledge of machinery, and in rendering them more capable of some day commanding vessels in which perhaps one-third of the crew will belong to the engine-room department; but it must not be supposed that the Executives are required to become Engineers, any more than that the Engineers are required to become Executives; both have their clearly defined and separate duties. Such is the amount of machinery now put into ships that it is increasingly necessary that the Executive should be trained to its use, and for the same reason it is more than ever important that mathematics should be the most prominent part of a naval Officer's education. All seamanship is associated with the working and utilizing of forces, and may be termed mathematical; it generates in the student the principles of applied mathematics, so that whatever is the source of power, a well-trained seaman soon adapts himself to its proper and most effective use.

Lieutenants when first promoted (especially those who earn early

promotion by doing well at their examinations), are, after their long periods of instruction at Greenwich and Portsmouth, usually very deficient in sea-going knowledge; the sooner this is rectified by appointing them for service at sea the better, and it is not advisable to allow them to take up one of the special branches until they have shown themselves thoroughly capable as Officers of the watch. Of these special branches, such as gunnery, torpedo, and surveying, only a few words are needed. It is certainly necessary that a select few who show great aptitude for scientific pursuits should have every opportunity and encouragement in becoming experts in their special line, so that they may eventually fit themselves for filling the positions of the highest authorities on these matters. Apart from this staff of specialists, all other executive Officers should be more or less trained alike, their courses of gunnery and torpedo work should qualify them to perform the necessary duties on board a commissioned ship, and every Officer should be well acquainted with the duty of navigating, although in this last branch the aptest should be selected for the more important appointments.

No one doubts for a moment that it is desirable that our Service should produce men of highly scientific qualifications in the gunnery, torpedo, and surveying branches; but whatever may be their other merits, the most valuable men in time of war will be those who can best command, handle, and fight their ships, in fact, the best seamen—the aim of all training of the Executive should be to this end.

The Captain who will best handle the ship of the present day, and fight her with success, will be one who possesses the maximum of sea-going experience, the power to command, and a clear-sighted understanding of his means of propulsion and his powers of offence and defence. Sea-going experience, and power of command, are only gained by a life's study, the other items are mastered by carefully following the ever-changing systems of the day, being familiar with the nature and direction in which progress is likely to be made, so that when once in commission he can readily understand the peculiarities of his vessel.

The entry of seamen as boys, and their first training in drill-ships and brigs, is all that can be desired; from the drill-ships boys are now drafted to the Training Squadron, in which they serve until the age of eighteen (when they are rated ordinary seamen), and to which some return later on to serve another six months as ordinary seamen. This last period is not always carried out, partly because the present Training Squadron cannot accommodate sufficient numbers, and partly in consequence of the men's services being required in other ships; but this training so far as it goes is most beneficial. From the age of eighteen men engage to serve twelve years; the smartest of them qualify for A.B. at about the age of nineteen, and the others with few exceptions before they are twenty-one. It would be a great benefit to the Service if these three years (*viz.*, from eighteen to twenty-one) were passed in masted ships at sea, with this exception, that those who have obtained the rating of A.B. under the three years should be allowed to qualify in gunnery in one of the home gunnery

ships out of that time; but until they have had three years' man's time in masted ships—that is chiefly in the Training or Channel Squadrons—it would be well to consider them as not eligible for home service or mastless ships. Having acquired this amount of sea-going experience, they would yet have between eight and nine years to complete their first period of service, and from the time of completing the first three years' sea-time, all (with the exception of those few required to fill the higher ratings in masted ships) would be available for manning the more modern types of vessels; the least intelligent as man-of-war's men being employed in troop-ships.

The greater part of practical torpedo work is closely allied to a seaman's ordinary duty, and there is no reason why the splicing and fitting of electric cables, the working of torpedo nets, and indeed everything except the handling of explosives, should not be introduced into the earlier part of seamanship training. Gun, rifle, and cutlass drills are all part of the training routine, and as the Channel and Training Squadrons are composed of fully equipped war-ships, the necessary amount of these drills is carried out, so that even the youngest seaman is not strange to the weapons with which he may have to fight.

It has also been suggested that the crews of some of the Channel ships should be occasionally turned over to the mastless battle-ships and cruisers, which are in readiness at the home ports, for a few weeks' training in the summer months.

After the period of sea-going training referred to above, the seaman should be in all respects able-bodied; he is twenty-one years of age, and perhaps already a leading seaman, or even a petty officer; now is the time to fit him for his duties in the battle-ship of the future, to practise him in such matters as the use of machinery in connection with his duties, the exercise of guns of very heavy calibre, the working of torpedo-boats, and in fact all the more modern appliances of naval warfare, with which he may not before have been acquainted.

Since training for war service must never for a moment be relaxed, the seamen employed in mastless ships should be kept up to a state of proficiency and smartness by constant boat-work and whatever may be devised in the way of gymnastics, besides the gunnery and torpedo work and the ordinary duties of the ship; they would be also much benefited by occasionally having a few weeks' cruising in the local sailing cruisers, if it could be conveniently arranged. Another very important item is the training in signalling duties, which should now be gradually incorporated with the other branches of a seaman's training.

The gunnery and torpedo instructions carried on in sea-going ships cannot be too carefully attended to, and no cessation in the drills should be permitted until the crew of a newly-commissioned vessel is in every way prepared to take their ship into action. Waste of ammunition in carrying out the quarterly practice is reprehensible; great care should be taken to obtain the utmost possible benefit from every round that is fired. The imperative necessity of getting a damaged gun or other weapon again into action, without delay, should

be impressed upon both Officers and men. The term "obsolete," which is so readily applied to the matériel of the Navy not immediately of the present date, has the demoralizing effect of rendering the men dissatisfied with, and callous as to the efficiency of any arms or gear that are not of the latest pattern. It should be distinctly laid down that nothing is obsolete which may be required for use in time of war, and that it is greatly to the discredit of all concerned if any part of the fighting plant, old or new, is allowed to get out of order through any shade of carelessness or neglect.

The use of masts and sails is sometimes compared with that of a gymnasium, but those who think seriously on the subject must perceive the difference, for in a gymnasium intellect is not particularly required, whereas in the smart handling of sails and spars it is indispensable, and indeed its absence may endanger all concerned. In order to make a man-of-war's man, there is no training compared with that of seamanship proper, as carried out in a masted man-of-war; it practises Officers and men in all the attributes which will be of the greatest value in time of war, viz., intelligence, smartness, fearlessness, readiness of resource, and activity, and (with the Officers) in power of command. It is invariably the case that the ablest and smartest seamen make the best and most reliable gunners; not perhaps the best gunnery instructors, for in them a quality rarely found in a good seaman is requisite, namely, the power of committing to memory long pages of drill detail, and of subordinating their own intellects to the subject-matter they have to teach.

The working of war-ships under sail is the nearest approach to what will be experienced in time of war. For instance, on board a ship in a squadron working into, or weighing from an anchorage under sail, every soul on board must be on the alert, any neglect or wrong order given may cause at least great confusion, and perhaps serious accident, and all on board feel that unless the work is properly done they will be the sufferers, probably having to anchor or to weigh anchor again, or make good some serious defect.

If it were possible to set the present types of modern fighting ships to the work they will experience in time of war, ramming the enemy, colliding, grounding, being damaged by shot and shell, their crews replacing disabled guns, hoisting boats in and out in dangerous weather, rigging jury rudders, taking disabled ships in tow under difficult circumstances, &c., we could dispense with the training afforded by masts and sails, but as this is impracticable we have no other means of training our Executive, in order to render them capable of coping with such difficulties, than that of endeavouring to make them *seamen*, and as such by battling with the elements to develop the readiness of resource and self-confidence in critical moments which is indispensable to enable them to meet the emergencies and accidents of war. Sails are not in the question, except as a means to an end, but an indispensable means, for which no other could be an effective substitute. Captain FitzGerald, in a paper on "Mastless Ships of War," read at this Institute in 1887 (see Journal, vol. xxxi, p. 121), having condemned sail drill, &c., could only suggest, in lieu,

that men "could be given so many hours a day to fiddle with the live heads of Whitehead torpedoes with the detonators in; or they could be set to work to hammer sensitive fuzes into filled shell," but of course this is not meant seriously; nevertheless, what has baffled Captain FitzGerald has baffled all others, for there is *no* substitute, and the only alternative is to allow the man-of-war seaman to become extinct. Imagine the Officer in command of a ship in war-time, who had no one on board he could depend upon to steer a course, to obtain soundings, to man a boat under difficulties, to work tow-ropes, to rig a derrick, to improvise any purchase in lieu of some damaged machinery, to secure a torpedo boom broken adrift, or even to clear a flag foul aloft on the military mast; how he would bless the so-called reformers who had abolished sailors!

3. *Squadrons of Instruction, &c.*

In time of war our fleets will be composed of all available ships, many of which will be of the latest types, powerful steamers without sail power, whose crews will consist largely of stokers and marines with a nucleus of seamen proper, and a full number of executive Officers. In fighting the guns, in repairing damage, and in doing the innumerable duties (coaling, provisioning, boat-work, &c.) upon which the fighting efficiency of the ship mostly depends, a Captain will have to rely chiefly on the ability and men-of-war's-man-like qualities of the Officers and seamen under his command, and the Navy which can display the most of these qualities will have the advantage. In times of peace the ships principally required for sea-service are those that can accommodate the largest crews, and that in a healthy manner, providing for both Officers and men sufficient employment of such a nature that the Officers have constant experience in commanding men, and in carrying out all kinds of intricate evolutions, and that the men have constant opportunities of using their intellects and learning how to carry out orders with alacrity and precision. For this purpose masted ships with good accommodation should be employed where practicable, and kept cruising as much as possible under sail.

The Mediterranean Squadron is necessarily composed of modern mastless ships (sails being of no use on that station), which would with a few additions form a powerful war fleet; and on other important foreign stations there will shortly be a fair show of modern vessels. As these increase and the older vessels are withdrawn, the necessity of providing for more training accommodation for Officers and seamen will probably be met by increasing the number of ships in the Training and Channel Squadrons. It would also be advantageous, if sailing training ships, such as the "Cruiser," now at Malta, could be attached to our squadrons on other stations as well as the Mediterranean; for instance, one might be stationed at Bermuda, and cruise in the West Indies in the winter, another at Hong Kong, cruising as far as Japan in the summer, and perhaps a third in Australia, all being employed in doing similar good service

to that performed by the "Cruiser," a vessel, for the benefit of a few weeks in which, many a midshipman has need to be thankful.

It is often asserted that the Channel Squadron should form the nucleus of our principal war fleet in home waters, and should therefore be composed of the latest types of war-vessels, which latter, it must be borne in mind, being mastless, carry very few seamen, and as powerful steamers are not suitable for long periods at sea at slow speed (in peace-time), or much use for training the seamen class even if so employed, would it not be a better policy to make the Reserve ships the nucleus of our home fleet, and to let the Channel Squadron consist—as at present—of the older ships with plenty of accommodation, and the means of keeping their large crews in healthy exercise?

Imagine the home fleet consisting of the coastguard ships, each a battle-ship of modern type, having attached to her a vessel of "Mersey" or "Melpomene" class, another of "Rattlesnake" class, and two torpedo-boats, manned when at her coast station by a reduced crew of trained seamen, marines, stokers, &c., and able at twenty-four hours' notice to complete her crew, and those of her satellites from the coastguard men of her district, and be on her way to the rendezvous at any port in the Channel. Here you would have a splendid and fully equipped fleet, manned in a most efficient manner, and ready for service; so organized that when not called out, the crews of the ships in their reduced state would be sufficient to keep everything in perfect order.

Again, imagine a Channel fleet of six or perhaps eight such ships, as "Minotaur," "Hercules," and "Triumph," intended to carry on the training of the younger Officers and seamen, principally with the view of accustoming them to a sea-life. Periodically these ships might be brought to the home ports, and turned over to modern fighting ships, each of their large crews being divided so as to man two or more of these vessels for a few weeks' cruise in the summer.

The Training Squadron is at present doing admirable work, although it can hardly accommodate a sufficiently large number of men to achieve the desired amount of training. The ships of which it is composed are the best of the older cruisers, and as they are fairly good steamers and well armed, there is no fear for their safety should a naval war be suddenly forced upon us. They are well masted enough to enable them to make a good passage under sail, and their accommodation is satisfactory, the four ships carry about 1,400 men all told, of which about half are ordinary seamen and boys under training. The work devolving on the Commander or First Lieutenants of these ships, augmented as it is by the frequent changes of Officers and men, and the constant training duties, in addition to usual routine work, is very arduous, and these Officers deserve every encouragement. The petty officers have also much more work than in most ships, owing to the youth and inexperience of those under their charge, who require continual instructive supervision. The work of the other Officers is nothing out of the common, beyond the fact of these ships having about double as much sea-work as any others.

Besides the instruction in seamanship which is in constant progress, the ships of the Training Squadron are exercised in naval tactics either under sail, or when steam is raised, under steam; the new signal books have been thoroughly studied, and it may truly be said that more signals are made in this squadron than in any other.

During the first three years in one of these ships, the "Rover," 482 ordinary seamen and 362 boys had an average of six months' training; 44 midshipmen served on board the ship, of whom 30 passed for Lieutenant in seamanship (10 obtained 1st class certificates, 12 2nd class, and 8 3rd class, two midshipmen being turned back). During this period the squadron accomplished the distance of 55,432 miles in 11,070 hours, of which 32,210 miles and 7,463 hours were under sail. Eighty ports were visited, the squadron arriving or leaving under sail alone 58 times, occasionally under difficult circumstances. As a specimen of the sailing qualities of the squadron, on one occasion the passage under sail from Teneriffe to Barbados, a distance of 2,580 miles, was made in $16\frac{1}{2}$ days, an average of 156 miles a day; on another occasion the squadron averaged under sail 200 miles a day for 9 consecutive days, completing a passage home from Bermuda in 19 days.

The cruising of the Training Squadron in the West Indies in the winter, and in the Mediterranean, Baltic, and home waters in the summer (during which the squadron twice took part in the fleet manœuvres), was a varied experience of work, interest, and pleasure; many interesting foreign ports were visited, where the Officers had the opportunity of seeing the ships and dockyards of other navies, and were everywhere received with the utmost cordiality and good feeling; in fact, anything more instructive and generally beneficial to both Officers and men than service in the Training Squadron cannot well be imagined. There is reason to hope that the squadron may some day be increased in number, or what will be even better, that a second squadron similar to the present one may be fitted out.

4. *Conclusion.*

The opinions expressed in this paper as to the importance of seamanship training are thought by some people to be old-fashioned and inapplicable to the present day. That these or similar opinions were held by our forefathers there is no doubt, and it was through the strict adherence to them that former great naval commanders earned the name of being the best seamen in the world, and as such, carried all before them, making our country what it is now. Are we to lightly barter away the heirloom of their prestige? Is there any reason why England should not still boast of at least giving her naval Officers the opportunity of being the most experienced seamen in the world? If to be experienced seamen is out of date, we may find to our cost that winning a naval action is also a thing of the past.

It is believed to be a fact that none of the principal ocean steamship companies will admit an Officer into their employ, unless he has

served an apprenticeship of four years in square-rigged sailing ships, and some companies go even further, and will only take an Officer who has commanded a sailing vessel. What the shipowners find is that a youngster apprenticed in a steamship learns how to clean bright work, but practically little else.

The reasons for the unpopularity of seamanship proper are not far to seek: in the case of some Officers—we hope but few—the real fact is that they do not like work, and in masted ships on long cruizes they are not so comfortable as in mastless ships constantly at anchor or alongside the dockyard wall. The voices of these gentlemen are frequently heard in the Service papers, deluding the public into the belief that theirs is the advanced view of naval matters. Another class of objectors to seamanship training is found in certain Officers of the scientific branches, who devote themselves so entirely to their own particular work (often to the great benefit of the Service), that they lose sight of, or even ignore the necessity of employing means for the purpose of training which are foreign to their sympathies, forgetting that hitherto we have only employed Officers and men who have been brought up as seamen, and that we have no experience of what is to be expected if their training as such, ceases. It is notorious that no other means of training is suggested by these Officers beyond a vague assertion that the personnel ought to be trained in the vessels which they will have to fight, which apparently implies maintaining our Fleet on a war footing. Again, a third class of opposers to seamanship training is composed of those who, on political grounds, would insist on the pushing forward of modern ships, and—disregarding training—are satisfied with the personnel so long as it is numerically sufficient, feeling (and perhaps with reason) that while the older ships are employed, and men-of-war's men are trained as sailors, there will be so much less money to be spent on the newer vessels of the war fleet. This party includes in its numbers some of those Officers who have completed their term of service, or who, for other reasons, have no further prospect of commanding our ships or fleets, they therefore are apt to drop out of their reckoning the importance to a Captain of having with him experienced Officers and seamen on whom to rely in time of war. The cause of objection of this class deserves attention, its remedy, however, is not found in sacrificing one great object to attain another, but rather in so providing for the wants of the Navy that neither the personnel nor the matériel should suffer; and by a judicious organization the war fleet be periodically mobilized, while the time during which it is not mobilized should be passed by at least the younger Officers and seamen in healthy and beneficial employment at sea.

There is undoubtedly in nearly all experienced naval Officers a latent, if not an active opinion, that seamanship in the sense suggested in this paper is still necessary, latent and unexpressed by some because they are fearful of being classed as out of date; but is the withholding of such opinions beneficial to our Service? It is to be hoped that those who honour this paper by joining in the discussion will throw off all reserve; and if some speakers do not possess even a

latent regard for seamanship, they will not express their objections in vague terms, but will suggest some definite alternative either for the training of the Executive or for its reorganization.

Lieutenant HENRY CHAMBERLAIN, R.N.: Mr. Chairman and gentlemen, the subject of naval education appears to me to be essentially one in which Officers below the age of fifty certainly should mainly interest themselves, because if they now are in active service as Captains or Commanders, in a very few years' time the fleets officered by young officers will be entrusted to their care, and if those Officers are not sufficiently trained, they (the Admirals) will suffer probably like Admiral Byng suffered in the last century, and on their shoulders will fall the terrible weight of inefficiency which is not due to them, but to the fact that the subject of naval education is looked upon at present as of secondary importance. It is really of primary importance. We have at last discovered that we have not enough ships, and are going to build seventy more, but we have not got sufficient officers to begin with. Supposing, however, for the sake of argument, that we had them, let us look at the suggestions that are brought forward in this paper. The first thing which strikes one is that we had better get our definitions. What do we mean by "seamanship"? We talk of "sailors," seamanship," and "seamen." One man means one thing and another man another thing. In my private opinion "sailors" are essentially men who have passed away. There are no "sailors" in the strict sense of the term, any more on the active list, or hardly any. Without disrespect, if I may say so, there are hardly any "sailors" of the olden days left; but I should be extremely sorry to say that there are not very good "seamen." They are very distinct people from "sailors:" as distinct as chalk from cheese. "Sailors" no longer exist, but *seamen* may exist to the end of days. As long as the sea exists, so long seamen will exist. There will be always machines to put on the sea, which you call "ships," which people will be able to manage in all winds and weather; to run them into one another if they are enemies, and to keep clear of each other if they are friends. These men are seamen. We are rather apt to be down on our luck on this question, and to think that seamen are passing away. They have not, and they need never pass away. The young men of the present day have as good intelligence as their fathers, or even their grandfathers, and you have as good material now as ever you had before in the Service. That is a statement made by Admiral Sir Geoffrey Hornby, who, I suppose, is one of the best Officers in the whole Navy, and he says, "You have as good material now as ever you had;" but he adds as a rider to his statement, "You have splendid material, and you make absolutely no use of it." You have intelligent young men, you admit them at fourteen, but you do not train them. Talking about this question of training, it is a very good plan to begin at the beginning. Captain Noel, of course, is dealing with a very large subject, but I wish to ask this question—Had we not better begin at the beginning, and train our young Officers from the day of their entry? Scarcely a single reference has been made to the inefficiency of the present system of training, and the possible efficiency of a modified system. As a matter of fact, it is impossible to attain the objects laid down in this paper unless you make a *radical change* in the whole system of training, beginning at the age of fourteen. Captain Noel says, "The three years of a midshipman's service before passing for Lieutenant should be more devoted to learning his duty as an Officer than to anything else." Quite so. Everybody rightly said "Hear, hear" to that statement, but how are we to do it? I know an Officer, present in this room, who has a son in the Royal Navy. The boy is on the East Coast of Africa, where all day long he is away picking up valuable experience in open boats, employed possibly against slave dhows. With ten or twelve men, you come suddenly on a slave dhow, and on such an occasion the intelligence, the pluck, the decision, the forethought, everything which makes a young seaman, would have to be brought into play at a moment's notice. What is happening to that boy? Every week that passes over his head is so much time *lost*. Why? Because, under the present system, he is not under a Naval Instructor but is away in a boat. The actual fact of the matter is that these midshipmen on the

East Coast of Africa are going to be recalled and put into these large ships. They are going to be removed from the sphere of experience to be put into the sphere of theory, because if they are not taken away they may only obtain third classes at Greenwich, and your best Officers will be delayed in promotion, while your least good Officers will be promoted rapidly. Now the father of this young boy is an extremely able Officer, who belongs to the old school, but he also has gone with the times, so he is saying this: "I know that from a seaman's point of view it is bad that my boy should leave his present ship, but I know from the man of the world's point of view it is a good thing that he should leave that ship. Which am I to do, to ruin his career, or to make him 'no sailor'?" Which would you do? Which would any father in the room do? He would chuck the seamanship overboard, because he does not want to ruin the boy's career—and there is the evil of the whole system. You have a system at present which works extremely badly, and which every year works a little worse, which not only is condemned by outsiders, who see the most of the game, but is also condemned by the intelligent Sub-Lieutenants themselves. I have spoken to them, and said, "Putting all prejudice on one side—for we are all old Navy and are all new Navy—what do you think you know about seamanship? What have you had the opportunity of learning?" This man whom I was speaking to, a very intelligent "Sub," said, "To tell you the honest truth, I do not know much, and for a very good reason, that I have never been taught." But whose fault is that? It is the fault of the system. If he is taught it (*i.e.*, seamanship) his career is jammed, because he gets a third class at Greenwich, and if he is not taught it, he is perhaps put, at the age of twenty-one, on board a ship, an ironclad, which has cost half a million, without having had *any* experience. In the old days, in the days of our gallant Chairman, a lad at the age of seventeen knew more seamanship than our Lieutenants of four years' standing. I say with all confidence that that is a great scandal, and we must alter our system. You referred, Sir, to a damaged gun, and you said that now-a-days a seaman could not replace a damaged gun. I think it is only fair to the seaman of to-day to say this: if Lord Dundonald was sitting there *he* could replace his gun, because two fellows could lift it, and even forty years ago the guns were mere toys compared to what they are now. If a gun gets damaged now, the best seaman in the world cannot lift it with the appliances on board ship, not the very heavy guns, therefore how could they be removed and replaced? What purchase could you get to lift your very heavy guns on board any ships? Even if you had masts you could not trust to masts. It is not a question of seamanship, therefore, but a question of dead weight and "purchase." The size and power of the man has remained the same, but the weight of the gun has increased in an alarming proportion, so that I do not think it is fair to the seamen of the present day to say that they could not replace their guns. The lecturer refers to seamanship in this way: "Imagine an Officer in command of a ship in war-time who had no one on board he could depend upon to steer a course"—a "course" is steered by compass; and masts, yards, and sails are perfectly unnecessary in order to impart such knowledge to our men—"to obtain soundings"—this is done by using a lead-line, and no masts are required in order to instruct a man in the art of taking soundings—"to man a boat under difficulties"—no masts required in order to do this—"to work tow ropes"—you can tow a derelict without masts—"to rig a derrick"—a derrick requires no masts beyond one, which would take the topping-lift; I believe I am right there—"to improvise any purchase in lieu of some damaged machinery"—purchase can be improvised without absolute masts; purchases are made with ropes and blocks; if you will go to Woolwich you will see some marvellous purchases for lifting these 63-ton guns—"to secure a torpedo boom broken adrift"—that requires no mast, or certainly not more than one military mast—"or even to clear a flag foul aloft on the military mast"—well, that requires a man, as we all agree, who has had training, and for that you require more gymnastics. As regards training squadrons, the training squadron is an absolute necessity for maintaining our supremacy at sea as a fighting Power, not on account of the sails, but on account of the scientific intelligence, the originating power, the general activity and bodily health acquired by trained men. I think that these training squadrons are most useful for that. I hope that they will continue so.

Admiral Sir GEORGE WILLES, K.C.B.: Last year I met Captain Shaw, of the Fire Brigade, when he informed me that he had ceased to take men-of-war's men into his Fire Brigade, because they had lost their character of agility. That being the case, you may imagine with what pleasure I have heard Captain Noel's address. I agree with him in nearly every point. The Training Squadron has been of immense utility; the First Naval Lord deserves great credit for having had the moral courage to re-establish it. There is no doubt a large number of my brother Officers (I say it with regret) who ridicule the idea of a ship with masts, and spars, and sails, under any circumstances, but I maintain they are wrong, and if we want to keep up the character of the British sailor we must retain masts, and spars, and sails, but for training only. Of course, with an increased Navy, instead of four ships there must be at least six, but that is a detail. Captain Noel has carried us up to the point of the men quitting the Training Squadron; I rather regret that he has not gone further, because there is no manner of doubt that any great measure of success in our battles of the future will be due to the most skilled gunners. I have had the opportunity of watching what has been going on in the training of our men, and I really think it is most faulty. When the "Excellent" system was first established we had not a standing Navy, and it was arranged that a sufficient number of men should be trained, so as to get a captain for every gun, and enough men to work the magazines; but in 1852 we established a standing Navy, when we ought to have amended the whole system. Many of you would hardly believe it possible, but our men are still divided into sheep and goats, and any young man who has been a bit of a scamp, and some of us, I have no doubt, have been scamps in our time, is sent to sea before he has become a skilled gunner. What is the consequence? The number of young men whom I had to get discharged from the Navy during my period of service at Portsmouth really pained me, and chiefly for breaking leave. Whereas these young men, these scamps, would be just the men we should be glad to have in battle. They are trained at great expense and then discharged; whereas, if the sheep and the goats were all mixed together, the latter would forget all their troubles, and most likely turn over a new leaf. Many of them would marry and settle down. There is another point Captain Noel has omitted, another very important question—*stokers*. Nothing can be worse than the training of our stokers. I was not out with the ships last year, but I read in the newspapers, and I read that most valuable report of my three brother Officers, which stated that there was a great want of trained stokers in the Navy. Now you cannot train a stoker under two or three years, and you cannot train them without driving your ships at full speed. I do think it is necessary that we should follow—I am not too proud to follow—the Italian Navy, and adopt their plan, and keep one or two ships constantly running out to Malta and Gibraltar at full speed. What is the use of talking about a ship being able to steam 18 knots, when you have not got the stokers to drive her at that speed? It is absurd. With regard to the Officers, I would make one suggestion: there is no doubt that the young Officers of the present day are a splendid set of young men; but I think they want a little more, I might say a good deal more, sea-training. I have always thought that when they quit the "Britannia" the naval instructors might be left behind, and that for the three or four years they are away the boys might learn seamanship; going away in their boats teaches them something better than working in the fore cabin. But it is said, "Oh, but if you interrupt their studies they will not get five first classes. Really, I do not much care about it; I am thinking of the Navy of the future; I want to have fighting men and fighting Officers, and that cannot be learned by studying α .¹ A gallant friend of mine, who, I am sorry to see, has left the room, and therefore perhaps I ought not to quote him, said, very truly, many years ago when he was pressed, that the success of an encounter depends a good deal more on

¹ It is, of course, necessary to have a proportion of Officers with high scientific attainments. After the examination for the rank of Lieutenant (which should not occupy more than a few months), young Officers who have a talent for mathematics should be allowed to study at Greenwich. A great deal of time is now wasted in cramming those to whom it is distasteful.

the stomach of the Captain than on anything else, and he never said a truer word. Well, but stomach can only be acquired by experience; it is impossible without sea training. You would scarcely believe it possible, after what our gallant lecturer has said, that a Commander was lately appointed to command a ship who had not been to sea for ten years. Well, no insurance office would insure a merchant ship under such circumstances. Gentlemen, I won't detain you longer. Unfortunate circumstances have prevented me from attending any public meeting during the last five or six months, but I should like to express my grateful thanks to those gallant brother Officers of mine who have agitated and brought about such a grand increase of the Navy. I am sure you will all join with me in expressing our thanks to them. There is no doubt of this, that without a powerful Navy England will be lost. There must not be a question of an enemy landing on our shores: they must not be allowed to land! I see a gallant General here, who will forgive me for saying that if the enemy does land, *corps d'armées* will be of no use; it must be a question of the command of the Channel.

Captain The Right Honourable Lord CHARLES BERESFORD, C.B., M.P.: I think the thanks of the whole Service ought to be given to Captain Noel for this paper. It is impossible to conceive anything of greater importance than the training of Officers and men for the sea. Captain Noel, I think, has been a little hard on some few of us who have opposed as hard as ever we could having masts, yards, and sails in battle-ships; but I think he has misunderstood our reasons for that opposition, and I will endeavour to explain what our reasons are. We hold that we have a Fleet insufficient for our wants, and therefore every ship we have, of every sort and class, ought to be a fighting ship—in other words, it ought to be ready at a moment's notice for active service. We hold that if you put masts and yards into a battle-ship proper, you may put her in a position (by having these masts and yards when suddenly called into action) of losing the action because she has got them, from the mere fact that in these days of accuracy of artillery it might be possible to knock those masts and yards over and foul the screw. On the other hand, I hold as strongly as Captain Noel, and I heartily agree with him, that the first necessities in your ships are seamen, that is to say, men of actual experience at sea, and a man cannot be an efficient Officer or a proper man to man our ships unless he has actual experience, and experience of a very extended character, at sea. I cannot speak about myself at this moment, but I feel very often in the House of Commons (as I sometimes endeavour to utter thoughts through my mouth that I believe are the thoughts of my brother Officers) that it is impossible for me to do so, as I have not been at sea for the last six or seven years; and many Sub-Lieutenants in the Service would give me two stone and a beating with torpedo-boats, as their practice is superior to mine. I entirely agree with Captain Noel as to the necessity of actual experience at sea. I do not wish to criticize him severely, but I do not think he has explained what we ought to do. My own opinion is this, that taking the home fleet, the home fleet ought to be sent to sea working in all sorts of weathers, three or four months in the year actually at sea. I would use the "Admiral" class as the Channel Fleet, but I would take some of their coal out and put a 5-inch steel belt on them to keep out high explosives, and so make them good fighting ships, for at present with their light ends, which can be so easily pierced, they are liable to go over. Then I would have not a half-and-half machine, like the "Minotaur," where men are doing more or less useless work, in my opinion, but have a regular training squadron in the Channel, besides a regular training squadron to go round the world, as it is doing now. I would have two training squadrons, and besides that I would have a cruiser in every station that England possesses. There is a practical way of doing it, but I do not think you get what you want if you mix up the two things. You must begin by sending your men into the cruiser ships and teaching them what is essential in order to obtain readiness of action and resources, without which no seaman is worth a snap of the fingers. The essential thing, as the gallant Admiral has pointed out, is practice with artillery, that one shot may win an action. You must teach your men to be as capable of pitching a shot in the proper place as it is possible to do. I entirely sympathize with the gallant Admiral. For years he has been trying to get a regular sea-going gunnery school, but besides that we must teach our men to be seamen. There is another ques-

tion about teaching the executive branch more about the use of machinery. In the old days, even in my time, I know perfectly well that your executive could tell your artificers how to repair a foretopsail yard if it was sprung. It is just the same now; your executive ought to be able to say to the Chief Engineer, "Do so and so." It is the Chief Engineer's work, but he must be under the executive, or else you will never win your action. Whether you are right or wrong, the executive should say, "I want that shaft repaired that way." The Captain of the ship and the executive Officer, in my own humble opinion, should know every bit as much about the ship as he did in the old sailing days, and say how a thing is to be done, no matter who is the expert to do it. The lecturer also spoke about the question of signalling. In my opinion it is a most important question to teach Officers and men far more of signalling than they know at present. At a particular moment in an action a clever Admiral may see something that would let him win the action. What does he want to do? He wants to get that something out of his head into his Captain's, but under your present system he cannot do it. I know the Admiralty have tried to improve it, but signalling is bad all over the world. Our present system of signalling not only in itself is bad, but the men that we employ are not sufficient. We must also remember that a whole fleet may be disorganized in a moment because your signalling staff has been destroyed. It therefore seems to me that the question of signalling should be largely added to the education of Officers and men of the Fleet. With regard to trained stokers, the stokers are the men who really win your action. We may say what we like of the man in the engine-room, but that man has to be a great deal more plucky than any of us: he never knows when a torpedo is coming towards the ship; he has to run the ship, and he does not know where he may be the next moment. That man has got to work at those fires in a very hot place, but unless he goes on working, the Captain cannot put the ship in position to enable him to win his action. Therefore I think the training of your stokers and engineer Officers ought to be entirely remodelled and reorganized. We have at present an entirely haphazard system, which would be very detrimental to us if we went to war. I also entirely agree with what the Admiral said as to the question of scamps. I was rather a scamp myself, I am afraid; but depend upon it a great number of men of this kind, as the Admiral has explained, who have been sent out of the Service are the very men you want to fight. Why the Admiralty want to get rid of these men for some offence against discipline I really do not know. Some people are always cantankerous. As a rule, the best boy in the school is the biggest "pickle" he has the pluck to get into, and the scamps are very often the best men you have got. They are altogether different from the scoundrel and the blackguard. A scamp is a good chap, always was, always ready for a fight. But many of these men are debarred by some absurd organization that they did not know of, they are debarred from becoming seamen-gunners. In my opinion your Gunnery Establishment is too exclusive: you should train all the seamen and all the Officers, as far as you can, to gunnery. It is not that we do not want experts in the Gunnery Department, but the Officers and men should have the advantage of becoming gunners, in my humble opinion. I also agree with what the Admiral said about the younger Officers of the day. I believe we never had a personnel better than we have now, both of Officers and men, and I am not going to make myself out an old man, I hope. But as to the younger men in the Service, I think the whole of their wish is that they should be taught in peace what they would have to do in time of war. We must make our men and Officers able to do by ordinary experience what they would have to do in time of war. I think their mind is at one on these questions which I have so often endeavoured to bring before the public; and on which I think my brother Officers agree with me—if I did not think they would agree with me I would not say it—but we want organization. Our want of forethought in many questions connected with the Fleet is perfectly extraordinary, and I do believe, though perhaps some of my seniors won't agree with me, that you will not get that altered until you alter the present system of the Board of Admiralty, so that there shall be a responsible head for each detail, which you can hang up when anything goes wrong. If anything goes wrong at present, all they say is "Oh, it is the Board of Admiralty." I do think, in conclusion, that Captain Noel deserves the thanks of the Service for what he has brought forward, and I

hope sincerely that some definite scheme, if not on the lines I have proposed to this meeting, but something on that class of line, of teaching your men to be seamen first, and to spend some money on these cruising ships, will be carried out. Even if they are sailing ships I do not care, but I think you should teach your men to be seamen first, and then draft them into the great battle-ships and cruisers and torpedo-boats afterwards. I think that would be the best way of meeting the question, which to my mind is second to none in importance, as if we are to exist as a nation we must keep the command of the sea, even though our Fleet should have to be double what it is at present.

Lieutenant MURRAY AINSLEY, R.N.: As a young Lieutenant in the Service, I propose, with your permission, to say a few words. Captain Noel has given a very good *résumé* of the ideal of a naval Officer, but I agree that the use of masts and yards, his ideal, is unattainable. No doubt there has been a strong feeling lately among the younger branches of the Service against masts and yards, for where the guns and yards have appeared together the guns have always had to give way. The ship has to be made a perfect fighting machine, and it is no good putting up royal yards to play about, and all that sort of thing, if the guns are to be neglected. The ship must be made a fighting ship, and the yards and masts only used as an auxiliary for that purpose. Until that is thoroughly realized, the best thing will be to have the sails screwed on to the yards, so that no one but a blacksmith could play with them. At the present moment the men who ought to be learning how to fire a gun and use a rifle are playing about on the royal yards. As regards the Officers, the present system of training, I think, is very wrong in many ways. Lieut. Chamberlain's young man, I think, has mostly his Captains to blame: I do not think it is possible that a midshipman four years at sea should not learn anything of his profession. I think the cadets from the "Britannia" ought to go in a sea-going training ship for six months; the ship to be of the size of our smaller gunboats, and to be worked entirely by the cadets. This scheme was tried on a larger scale some years since, but the large scale made it a failure. The cadet should be a short time in a large-masted ship, and then for three years in a corvette on a foreign station. After that time his service should be completed in a mastless ironclad. The present examination in seamanship I can only characterize as a farce; you can toss up "Heads I win, tails you lose." If I get one Captain he will give me a first; if I get another Captain he will pluck me. For this a pass examination in seamanship should be substituted. Then on returning to England a Sub-Lieutenant should pass a pass examination without a preparatory course in navigation alone. They should then go through the gunnery, torpedo, and pilotage courses as at present, and then, optionally, a course at Greenwich. The present mathematical course is simply an attempt to put all the round men into square holes. Certain men never will learn mathematics, and you waste a great deal of a young Officer's time by sending him there. I have known one or two Officers who have come away from there, and the only time they wanted to use their mathematics was to find how much flannel was wanted to line a gun cover, and then they had to send out to some one to get him to do it for them. The extra course at Greenwich should last about three months, and the examination should be about the present Beaufort standard. It would be only the really first class men, and of course they would get a certain amount of kudos. Their promotion from Sub-Lieutenant to Lieutenant for examination is, I think, not at all right. You just miss a first class and get a second class instead: that means eighteen months time, which is hardly fair. As regards specialists there, I think there is room for many modifications. You do not want every Gunnery Lieutenant to be up to x and y : what you want him to be able to do is to teach the men under him the use of their weapons. If an Officer wishes to go in for a higher course of mathematics he ought to have further time. At present the course stops short just as you are beginning to learn. The first class people should have a whole year instead of nine months, and then go to Portsmouth. Sir George Willes spoke about the education of seamen gunners, and about men not being allowed to go in for gunnery owing to previous misconduct. I think that is very wrong indeed. There were in my last ship in the Channel Squadron two or three men who were really a credit to the Service in every way, and those men were not allowed to go in for seamen gunners simply because in their young days they

had fair characters awarded them. As regards the training of stokers the difficulty is to get men of sufficiently good physique; the second class stoker on entry is not as good in that respect as he should be. The midshipman's education at sea I think ought to be in the hands of the Lieutenant and not of the Naval Instructor: I think he would give better all-round instruction. Of course in a sea-going ship there is no doubt the working of the ship ought to be the principal point, and all instruction should be subordinated to that. Signalmen I do not think you can possibly train beyond a certain extent. A signalman is born, not made—you can vastly improve them, but not make them. With regard to the results of the training squadron service I must say, from the men I have seen coming out of it, they have not been so good as I could have wished. The cause is that they are too near home, and the cruises are not long enough. The men deteriorate in physique, they are really overworked for young men between eighteen and twenty-one. They also deteriorate in discipline. Too many young men are shipped together without a sufficient leaven of older hands, and the continual return to home ports may also be looked upon as a cause of this. When they come away they do not know very much about their useful drills, they affect to despise the humble seaman gunner, pretending that they are sailors.

Lieutenant LOWRY: Having carefully gone through the quarter bills of the ships in which I have served as First and Gunnery Lieutenant during the last seven and a half years, and taking gunnery instructors, torpedo instructors, captains of guns, and leading torpedo men, as specimens of highly-trained men in both branches, gunnery and torpedo, I find the following results: twenty-six were thoroughly efficient in their fighting and instruction duties, and had received a thorough seaman's training in masted ships. One had served in mastless ships only, and luckily was equally efficient. Three captains of guns were poor seamen, and had very little really seaman's training in sailing ships, but they were good shots and were retained as captains of the guns for that reason. They had the natural gift of being able to lay a gun. There was one torpedo instructor, and three leading torpedo men, good, theoretical men, but who lost their heads and were nearly useless in getting work done when in charge of a party of men. They had served almost entirely in mastless ships, and had been quickly rated on account of their readiness and quickness as instructors, and instructors only. Several of the best practical acting seamen gunners, and one who was acting captain of a gun for a considerable time, were refused at the gunnery ship on account of past conduct, or, in the case of the captain of a gun, because he could not write a good hand, though he was an uncommonly good captain of a gun. Probably the work to be done when a ship is aground is similar in some degree to much that will fall to our lot in a naval war, and tests what men are made of. During the week of varied and incessant work in H.M.S. "Sultan" when on shore, whether it was in rigging purchases, dismounting and transporting guns, getting sails over to stop the leaks, or placing and rigging a steam pump, the men who came to the front and did their work thoroughly well were the men who were active, well trained seamen aloft. It was not always the best seaman gunner, torpedo man, or marine artillery man who showed most readiness of resource. Wholly agreeing, as I do, with Captain Noel in his main contention that men should be thoroughly well trained in masted ships at sea first, there are some minor points in which I differ with him. He says, "It is certainly necessary that a few select Lieutenants, who show great aptitude for scientific pursuits, should have every opportunity and encouragement in becoming experts in their special lines," and I gather from the paragraph that, barring them, he proposes to do away with the gunnery, torpedo, and surveying lines. If so, the Drill Book and fighting instructions of the Services will be largely in the hands of Officers with small experience at sea, the very result that the whole paper so much deprecates. Each branch of the work will, I believe, be infinitely better done by those who make a special study of it than by an Officer who may be watchkeeping in a troopship, Gunnery Lieutenant of an ironclad, in a surveying schooner, or in charge of Whitehead torpedoes alternately. Few men can give the necessary time to keep up thoroughly the knowledge of all the minor details of each branch. We must remember, and no doubt we always do, that the Service is far more complicated now than it ever was before: there is far more to learn, and I do not think, with all due respect to Lord

Charles Beresford, that the ordinary executive Officer in a ship can make himself thoroughly master of every detail in the non-executive branches. I think he will do his work best by knowing sufficiently about steam to see that the Chief Engineer does his duty, and then let him alone to do it. The result of having the Channel Fleet composed of masted and so less efficient ironclads is that in every "war-scare" of recent years these ships would have had to bear the first onset had war broken out. Notably this was the case in February, 1888, when the Channel Fleet of five of our most ancient ironclads were hurried from Corsica to Genoa and Spezia, and if certain things had happened which people talked about, they might have had to meet, burdened as they were with masts and sails, the French Toulon Fleet.

Admiral WILLES: Throw them overboard.

Lieutenant LOWRY: But that cannot be done till war is declared, and it was not done till it might have been too late. The order was given to steam at full speed from Corsica, and during that time war might have been declared, and our masts and sails would not have been overboard; moreover, we should then have to extemporise a very large number of fittings, such as iron-top screens, to make these ships efficient. In conclusion, I would strongly urge that we make our Officers and men thorough sailors first, and then put them ALL through their course of gunnery and torpedo, selecting the best for seamen gunners, not only for instructors but for captains of guns, and for the more important numbers at the gun. We should have at least for heavy guns two men at each gun, who are thoroughly capable of making a good shot, and not only the captain of the gun. I must differ with a previous speaker about the results of the training squadron. I happened to be in a Channel Fleet ship, where we had a large number not only of young seamen but of petty officers, and these men, who had been brought up in the stirring work of a training squadron, were more efficient than the men they replaced who had been brought up in Channel Squadron ships, they rapidly picked up their gunnery and torpedo work. Let the sailing be done in largely increased training squadrons, and let our Channel and Foreign Fleets be thoroughly serviceable fighting ships. On the outbreak of war it might be necessary, and most naval Officers think it would be necessary, if we have an opportunity at any rate of making a dash at the enemy's fleet wherever they were, whether ready or not, at sea or in harbour; and we might then be able to strike a deadly blow at their power, which no amount of training in the personnel and no perfection of material afterwards, would enable us to effect as efficiently later on in the war. I am sure it would be the wish of every naval Officer, young or old, past or present, and whether serving in old or new type of ship, that he might be in it on that occasion.

Captain CHARLES JOHNSTONE: So much of the ground taken up by our lecturer has been gone over already, that it is rather difficult to strike out in a new line. I should first like to speak on the question of masted ships and the Channel Squadron. I cannot help thinking there is rather a mistaken idea in the Service with regard to the advocated use of masts and sails. I think the two things should be kept entirely apart, viz., masts and sails in the Training Squadron, and masts and sails in the Channel Squadron, that is to say, in ironclads. I think everybody will agree that masts and sails in the Channel Squadron are useless, and I believe everybody on board those ships feels that they are not there for use; they look upon them as only a way of making so much work. Sail is made but steam is not stopped; the engines are kept going at the same time, and everybody feels that the sails are a mere farce, they have merely been set to give the people some exercise, and nobody bothers his head about trimming them, because they are not really being used; to brace the yards up might interfere with the routine, and therefore it is not done as it would make no difference to the ship. You set all sails in the "Minotaur," but it does not make any difference one way or the other. I think all this gives a mistaken idea, and I must say I wholly condemn the masts and sails in the Channel Squadron. Not long ago the Admiral in command requested that the studding sails should be removed from ironclads. Studding sails no doubt are useless in an ironclad; the masts and sails are equally useless, and if one thing is removed why not the other? If the masts and sails are kept there for the purpose of gymnastics, or to teach men the use of the sails, why not retain the studding sails as well as the sheet; but I must say I condemn them altogether. In the Training Squadron it is another

thing. We are accustomed to rely upon our sails; we make our passages under sail, and work our ships in and out of harbour; we work our ships sometimes in and out of harbour in circumstances which would have been considered worthy of notice even in the days of sailing ships. Our ships are long, undermasted, and, I won't say unhandy, but certainly slow in their movements, and it requires just as much judgment to handle those ships as it ever did in the days of sailing ships. That being the case, I think the exercise in the Training Squadron under sail is perfectly efficient. I know some distinguished Officers, and I might mention Sir Thomas Symonds, who are entirely against having sailing ships only as training ships, they consider that all ships ought to have steam power, therefore much cannot be said against our Training Squadron on account of its having steam power, but the sails at present are perfectly efficient. If those who object to masts and sails would consider that it is not the same thing having them in a training squadron or the Channel Squadron, it may perhaps clear up the difficulty. There is only one thing in Captain Noel's paper with which I disagree, and that is when he says that the present system of training young Officers is satisfactory. It is so, he says, if they are kept up to work at sea; but that is just what you cannot do; when you have a midshipman in the fore cabin at school he cannot be attending to any other work. A boat midshipman is a boat midshipman by name, but he cannot take the interest in his boat that midshipmen formerly did. Formerly a midshipman was always away in his boat; he was interested in his boat; he was there to see his boat hoisted up, and to see that all was right about her. Now it is quite the contrary: a midshipman does not care whether the boat is clean or dirty, he takes no particular interest in her. I think it is very objectionable, because it kills the first buddings of zeal in the young Officer. On the other hand, a higher standard of education, that is to say, of theoretical education and book-learning, is necessary; a higher standard is now necessary than there was formerly. We cannot go back to the old-fashioned way, where the youngsters in the Service were required to learn the three "R's," and nothing else; we must have a higher system, and to do that we ought to clear the school work away entirely. The youngster should have got through all pure school work, that is to say, pure mathematics and all those things; and he should have got a thorough grounding in that before he goes to sea, and when he goes to sea he should devote himself solely to professional subjects, that is to say, he should then begin the application of the things he had learnt before to his profession as a seaman, that is to say, the trigonometry and the different mathematics he had learnt before should be applied to work out navigation and other problems of that nature. If that were the case we may at once do away with the naval instruction. We have plenty of Lieutenants in the Service who are quite capable of instructing young Officers. It is an entirely different thing to what it was formerly, when Lieutenants, as a rule, were uneducated, and certainly it was difficult to find an Officer who had a knowledge of mathematics. We have plenty of Lieutenants thoroughly well educated, and perfectly capable of taking charge of midshipmen, in fact, I may say much more capable of taking the charge and instruction of midshipmen than average naval instructors. One speaker mentioned that the Lieutenant would also take charge of the other instruction of midshipmen. That I quite agree in; it would be an excellent plan; but there is another important advantage, which is, that in the great outcry against civilians on board ships you would remove the civilians and increase the number of Lieutenants; you would have an additional Lieutenant in the ship; he would be there for the instruction of the midshipmen. You would have an additional fighting Officer, so that you would have positively an additional Lieutenant in the Service without any additional expense. That is a matter very well worth attention. To do that we must enter the midshipmen rather later. There are objections to that; I know that many object very strongly to that, but I hope the objections will be overcome. We know that distinguished Officers have entered the Service late; we know Lord Dundonald entered late, and therefore I think we must not say a youngster cannot learn his work if he enters later; besides, it is to be remembered there are Officers at the present time in the Service who entered at a later age. A distinguished Officer entered at the age of fifteen; the average age is now fourteen. I think there were some Officers who entered at fifteen and a half, and some of those

Officers hold now distinguished positions in the Service. I think that is well worth consideration, especially when we think that we should sweep away the whole of the regular school instructors, and should have the midshipman absolutely free to do his duty without any interference on the part of education. One more point, with regard to masted ships. I think every sea Officer will agree that the only thing to make seamen is to keep the ships at sea. What we want is, that we should be at sea; we ought to spend our time at sea, and ought not to be wasting time in harbour, which is the rule of the Service now rather than the exception. The expense of keeping ships at sea under steam would always militate against that; there would always be an objection because of expense. If a large number of training ships, fully masted, were steam ships as well, you could keep them at sea under sail without expense, and that is a very great argument indeed. I do not think anything could be said too strongly in favour of keeping our ships more at sea than they are at the present time.

Captain LONG, R.N.: After the very eloquent speeches we have heard, I will not detain you one moment, but I should like to tender our thanks to Captain Noel for bringing this subject before us again so ably. There are one or two points on which I should like to remark. I cordially agree with all the speakers who have put before you that the first essential is that our Officers and men should be seamen, that is to say, that they should have their sea legs, and be just as much at home at sea as on shore, and they certainly never will be unless they are kept at sea a great deal more than they are at present. There was a curious instance the other day: a ship went round from Pembroke to Plymouth, and everybody was sea-sick, I believe, from top to bottom, senior Officer to junior stoker. An instance of the same kind occurred to me when I was in command of the "Agamemnon," when we were going down Channel against a strong breeze, the stokers were all so sick that they could not stoke. It therefore seems that if you exercise one-half of the Service without exercising the other half there will be difficulty. There is another point I wish to bring before you. It seems to me a mistake that we allow our young seamen in many cases to be detained in harbour ships. I happen to know several cases where young seamen under twenty-three years of age have been kept three years in a ship like the "Nankin." It has been reported on by the Officers, and everybody deplored it; but surely a system under which such things can occur must be very faulty. It is because we have not enough ships and a large enough training squadron; we ought to have two or three such squadrons, and to make it an essential point to keep our Officers and men at sea. Captain Noel speaks of the manœuvring ships under sail as the nearest approach to what will occur in action. Now I cannot agree to that, because in my career, and specially when I served under my friend, the gallant Admiral, Sir George Willes, I had the pleasure of seeing a good deal of boat tactics under sail and steam, and the part of my experience which I think most valuable from the point of view of carrying a ship into action was that part in which we were doing naval tactics under steam, more especially at high speed.

Captain NOEL: May I ask if that gives education to anybody besides the Officers actually carrying on the ship? When I say "taking a ship into action," I refer to the whole crew.

Captain LONG: Quite so. I was going to say, the manœuvring of a ship could only exercise the man who is doing it, but if the crew and Officers are at their quarters, and are pointing every gun as they would be in action, I think they all gain a great deal of experience which can only be gained in that way. I think we do not do nearly enough of that. It has been advocated by many Officers; I could mention Captain King with regard to torpedoed, and I think most of us who have to do with torpedo-boats find we gain a great deal of experience from having a number of vessels moving about; it was a point we had not previous experience of, because the slow boats that we exercised with whenever possible in the Navy do not give you that experience that you have when you are going 18 knots. There is one point worth considering in that matter, that the experience a man gets in a sailing ship is such a totally different thing from what he gets when steaming at full speed in a modern steamer. The only experience that is valuable is what you are going to have in action; it is no good having other experience; you must

actually point your gun when the ship is going at a high rate of speed, and your stokers are strained to the utmost. I would remark also there is nothing said about training the seamen as stokers, but something of that kind has been advocated. I think the man who is in the stokehold wants as much training as the man on the topsail yard. I would also urge the great importance of tactics. Admiral Baird spoke very strongly last year on the importance of studying tactics. I am afraid it is still the case that we have no regular course of instruction in what might be called strategy and tactics; as part of our curriculum I am afraid it is still wanting.

Admiral P. H. COLOMB: I should like to add something to the last remark of Captain Long. The Government have made some advance towards teaching strategy and tactics at Greenwich, of which they have made me the humble instrument. A course of lectures on Naval Strategy and Tactics has been going on for three years there, and we are in the middle of a course now. A good deal has been said about the discharge of seamen as objectionable. Sir George Willes knows very well how often we have talked over the difficulties of that matter, but it is a matter chiefly in the hands of Captains of ships. If Captains of ships put men in a second class and send them to receiving ships in the second class, there is a difficulty in getting rid of them to sea, because you cannot send more than a certain proportion of them to any ship. These second-class men only grow worse and worse the longer they are kept in harbour, and ultimately, as far as my experience goes, it is from these men that the discharges chiefly come. It was a matter forced on us; it could not be evaded. The remedy is, I think, for Captains to avoid putting men into the second class as far as possible. The lecturer suggested that there were some speakers who did not possess even a latent regard for seamanship. I do not know whether he was at all referring to some of my efforts in that direction, but I think there is not a single naval Officer of the old school, that is, who have served in sailing ships, who could possibly fail to avow the strongest latent regard for the old seamanship. But what I am afraid of is that a great many Officers do not sufficiently suppress that latent regard, that they allow their sentiment to a certain extent to override their judgment. I was strongly struck with that myself coming up Channel as an umpire in the "Rodney" during the manœuvres last year. When steaming at good speed we passed a most lovely ship, I thought one of the most lovely things I had ever seen in my life, one of the great liners to Australia, under sail close hauled on the starboard tack, everything looking just as it ought to look, every sheet close home, not a leach lifting, nothing wanting to please the eye and make one long that it might all come back again to the old life. But there we were standing in the "Rodney" beside the 67-ton gun, and what use was it? One could not help clinging to these regrets, to these beautiful ideas, but we must simply sit upon them and stamp them down. Because, after all that has been said to-day, what it comes to is that our men have to be trained, men and Officers, for that which they will have to do when war breaks out. If you tell me the best preparation for that is the training of the old school with masts and sails, and if you prove it—and I must be allowed to say that I think Lieutenant Lowry has come nearest to proving it of any of the speakers, because he has actually brought the training of sailors into the Gunnery Department, and he has shown as far as the figures go that these men turned out exceedingly good at their guns—if it be proved that the men trained as royal yardsmen, and so on, make the very best gunners, and that it is a necessary point of gunnery and fighting training, all I can say is the sooner we set to and train them all in that way the better. But the proof is, I am sorry to say, not sufficient, and we have to recollect what it comes to according to the lecturer's views. He wants all our seamen to be kept for three years of their twelve in sailing ships or masted ships. That means a navy by itself; it means 7,000 men always in masted ships? How much will you lose if you do that? But still, if it is certain the training mast and sail is a necessary beginning for the seaman of the present day, we must have it. Then I think we must go a step further. Although it has been stated that a great authority, Admiral of the Fleet Sir Thomas Symonds, wished that training ships for sail exercises should be steamers, I think if we are going to do the thing we had better do it thoroughly, and not have steamers, but regular good thorough-going sailing vessels, and nothing

else. If you are going to train the men and make them sailors of the old school, surely every instant you are under steam means so much loss to the seamanship. But to me there is a bigger question behind the whole of this, that we must not separate more than we can help the two great Departments—what the lecturer calls the Executive Department and the Engineering Department. There is no question that that vast separation at the present time is the greatest difficulty that now exists, and if we do not mind what we are about it is a growing difficulty which may overmaster us. For my part, although it is utopian to hope for it, perhaps, I think that our business is to use every nerve and every effort that it is possible to do to place the whole management of our ships in the hands of a single class, to get the propulsion of the ship and the fighting of the ship into one set of hands, and not into two. We are a very long way off it now, but I am afraid the more we hark back to the older style of things the more difficult it becomes to draw the two classes together and to amalgamate them into one, and the more remote is the time placed at which that happy result might be arrived at. As to the expense of keeping ships at sea under steam, I do not for one moment believe it. I most fully agree as to the necessity for keeping ships at sea. I think there is a great deal too much harbour, and with our seamen under our present system the point is not so much whether they have served in masted or mastless ships, but whether they have served at sea at all. When I was Captain of the “Duke of Wellington” I made that one of my studies, and was quite appalled to find what a very small amount of actual sea service most of our bluejackets had had. As to remaining at sea, that is the great point. To be away from land, to be away from boats and going ashore, for people to be thrown thoroughly into their ships and kept apart from everything else. When I was in command of the “Thunderer,” a mastless ship, in the Mediterranean, I made it a practice to be as much at sea as I could. We used not to steam so much, but our practice was to lie sometimes for a week or ten days simply with fires banked. We used to enjoy it most thoroughly; so much was it enjoyed that it became the practice of the fleet; and several times did the fleet simply bank their fires up and lie at a good distance apart. You then had the opportunity of working up the whole training of your ship free from interruption, making everybody accustomed to her, going on with your training without any irregularity or wish to get ashore, or any pressure of time for the Officer’s boat, and so on, but you had all the advantage with but very slight expense as to the expenditure of coal.

Admiral Sir J. C. D. HAY: May I say one word in corroboration of what fell from Admiral Sir George Wiles? The evidence of Captain Shaw was so clear and conclusive, I think, as to the great loss of activity in the seamen of the Navy through want of training aloft, that I think the Report of the Committee before which he gave his evidence would be worth while any of my gallant friends here referring to. I happened to be a member of the Parliamentary Committee before which Captain Shaw was examined, and he stated that he could no longer take men from the Navy for the work of the Fire Brigade, but he was obliged to get them from the merchant ships, because the old recklessness aloft, which was the best of all training for nerve and gallantry, had entirely gone away from the Navy, and was only to be found in the sailing merchant ships. I recognize, of course, that our battle-ships cannot have masts, but by some means or other there should be a considerable proportion of their early lives in which both seamen and Officers should have that excellent training which gives them the best possible nerve that men can have.

Captain NOEL, in reply: I am much gratified with the support I have received to-day. I think in the case of almost every speaker, except Admiral Colomb, I have had more or less support. I only wish a few more of the *seamen* I see before me, who are looked upon in the Service as amongst the most reliable of our Officers, had risen to make a few remarks in favour of what we must consider the backbone of our professional knowledge, that is “seamanship.” Seamanship I know is looked upon by the younger Officers in a somewhat different light to what it was in former years. I hold that seamanship is not necessarily the working of sails, but it is that knowledge of a sea-going life which can only be gained by constant sea-work, and what I contend in my paper is that we cannot get that constant sea-work without

putting our Officers and men into masted ships. I think Admiral Colomb has rather proved this for me. What he told us is that he used to take the "Thunderer" to sea, let her lie like a log on the water, sometimes for a week together. I would ask what seamanship experience was gained by any man or Officer on board by such a process? Why, even the experience of boating that he learns in harbour is denied him; he can, perhaps, do his gun-drill, his torpedo-drill, but what seamanship can he learn? The lead cannot be hove to take soundings, and a man is not even required to steer, and yet this is what is represented as seamanship training in lieu of the sailing of ships at sea. I am very glad that we have had views expressed by some of the younger Officers. I think Lieutenant Murray-Aynsley gave us a very nice little speech stating what *they* think of the matter, but I do not gather from what he said that he opposes seamanship. I dare say he would curtail the seaman's training rather more than is recommended in my paper. Lieutenant Lowry most thoroughly supports the view of training men as seamen, and I have had support also, I am happy to say, from higher authorities. Where my paper has been opposed more than in any other question is in the matter of making the Channel Squadron the squadron that will carry on the seamanship training. I was in the Channel Squadron some years ago when Admiral Sir Geoffrey P. Hornby commanded it. In those days we used to be under sail alone constantly; we would disconnect the screws, and the squadron remained under sail for three or four days at a time. I do not know why the same thing cannot happen now: surely the same ships are not more dangerous than they used to be. I purposely omitted, in the vessels I mentioned, some of those that cannot sail, the twin-screw vessels, for instance; but the "Minotaur," "Hercules," and "Triumph" classes are all fair sailers. I do not say that they should be taken in and out of port under sail, but still when they are at sea there is no reason why they should not be kept week after week under sail, and I believe some of them would do as well as some of the old line-of-battle ships. It is generally admitted that we ought to train our Officers and men to a sea life, and we are told we can do it in the new ships, but imagine a squadron of "Merseys," or some such new fast vessels, they carry very few seamen, and the only order the Officer of the watch has ever to give is "Boatswain's mate, pipe a hand from each part of the ship, up ashes." There is no ordering men about: there is no taxing the brains to know whether you are carrying on correctly in shifting your topsail, or some other evolution which is such admirable practice for both Officer and man, and in place of which (in mastless ships) I do not know what can be done. There is, in my opinion, plenty of time to train our Officers and men in the effective working of the new battle-ships. I do not despair of this at all if they are first made seamen, and they would qualify after a seamanship training in a third of the time that would be necessary if brought up in any other way. I am grateful to Lord Charles Beresford for his support: he has an independent voice with which at will he can gain the ear of the public, a power that always carries great weight. I only hope that he will thoroughly support the training squadron, and get it doubled, if he can. Of course I do not want masts and sails in battle-ships, but still if our Channel Squadron was used as it has been up to the present with masts and sails—and there I do not quite agree with Captain Johnstone, for I think they might be worked more under sail as they used to be—I contend that they should and could carry on the training of the younger Officers and seamen: they might be periodically brought home and turned over to the newer ships for some cruising in the summer; we should then get a very fair amount of training in masted ships. I beg to express my most sincere thanks to Sir Henry Keppel for kindly taking the chair. It is a circumstance on which I may most truly congratulate myself that the gallant Admiral, who for so many years has been looked up to and esteemed as one of our most splendid seamen, should have come amongst us in his old age and show that he can still say a word for the old Service. I have no doubt presently he will do so. I thank you very much for the patience with which you have listened to me, and I trust that this paper and the discussion on it—which has been so well sustained—will bear fruits to the benefit of our Service.

The CHAIRMAN (Sir H. Keppel): I do not know, ladies and gentlemen, that I am called upon to add anything on this occasion. I have long been on the Retired List, but I have been very much interested in all that has been said on both sides.

I am only an old salt, and have a very strong feeling that the naval education, the sea-going education, was always necessary for our Service. It is that that gives the sinew and strength to our men. I doubt whether the splendid men that now form the Navy would be the fine fellows they are had they not gone through a sea training. Above all they get that exercise of mind so necessary for every seaman that goes aloft. His life is in his hands. It is not like the sergeant of marines who drills men. The man goes aloft with his life in his hands, and he has to think before everything he does, and I maintain that is the training that the men want. The old school has passed away! I have now only to thank you for your kind attendance, and to say how much interested, one and all, we must have been in the speeches that have been made to-day, and in the lecture to which we have listened.

Wednesday, May 22, 1889.

GENERAL THE RT. HON. VISCOUNT WOLSELEY, K.P., G.C.B.,
G.C.M.G., Adjutant-General to the Forces, in the Chair.

RECRUITS AND RECRUITING.

By Deputy Surgeon-General W. G. DON, M.D., London Recruiting Staff.

The CHAIRMAN : I have to introduce to you Surgeon-General Don of the London Recruiting Establishment, who has kindly consented to give us the benefit of his experience in the recruiting service, a most important point in connection with an army raised entirely on the voluntary system. It will be followed by a discussion in which I hope those will take part who have experience in recruiting, or who have studied the question.

WHEN asked to lecture on Recruits and Recruiting in this distinguished Institute, I consented, in the hope and belief that my practical experience might add something to our knowledge of the subject, especially concerning its inner aspects and working.

I will avoid as far as possible alluding to methods and means employed in the past or at present to attract recruits under our system of voluntary enlistment; or reviewing the politico-economic aspects of the question; or discussing the bearing on recruiting of the military problems of long or short service; all these matters have already been fully treated by competent authorities within these walls.

The task I propose is to invite you to accompany me into the inspection room, and, while in direct touch with recruits and recruiters, view the inner working of a recruiting office.

From the following antecedents I think I can bring a good deal of experience to bear on the subject. When employed in the Medical Branch of the Director-General's Office, it was part of my duty to report and advise on the many appeals over disputed disabilities in recruits which were constantly passing through the War Office. Those who may have had a like duty to perform will readily recognize the difficulties of the position, inasmuch as recruiting disputes are not confined to matters of fact, but usually embrace wider questions of opinion.

To the varied but somewhat abstract and theoretical knowledge acquired in the War Office, I have since added an extended practical experience of four years in the London Recruiting District. During

that time I have personally examined nearly 20,000 recruits for all branches of the regular Army and for the Militia, besides being on the spot while nearly as many more were inspected by my colleague, Brigade Surgeon Gribbon. I am therefore able to speak with confidence on not a few points.

Most medical Officers during tours of home service of course see something of recruiting; but only a very few can or do have the advantage of studying it on the scale presented in London. That is by far the largest and most varied of our recruiting centres, not only having a gigantic population of its own, but sucking in, like a huge social maelstrom, all sorts and conditions of men, including at once many of the best and some of the worst of our provincial manhood. The great metropolis presents or reflects nearly every social and physical aspect of our nation's humanity, and in none more perhaps than in recruiting.

I intend to confine my remarks almost wholly to London recruiting, which, besides being within my own knowledge, is sufficiently large and varied to afford material for instructive generalization.

In addition to strictly personal and practical observation in the inspection room, I have there also had the advantage of being assisted by such honest and astute old recruiters as Staff-Sergeants Grix and Mister, non-commissioned officers who have been at the work for the past thirty years, and from whose ripe experience I have learned much. These men, and others on the Recruiting Staff, have, from daily observation during many years, naturally gathered an immense and curious fund of information connected with every detail of their duties. The insight acquired by our venerable recruiters is at once both interesting and valuable; it may lack both scientific breadth and exactness, but it takes a ready and firm hold of a recruit's individuality.

This leads me to ask, what is wanted in an Officer or a non-commissioned officer to make a thoroughly good recruiter? I would answer that, given of course personal intelligence and special aptitude, the most essential requirements are a thorough knowledge of the duties of every branch of the Service, combined with a large experience of the world-wide life led by the British soldier. Without such knowledge, those who enlist, those who pass, and those who post recruits will in many ways be working empirically, with the liability and result that square men will find their way into round holes, and *vice versâ*. If these observations be correct, it follows that, as a rule, only the older and more experienced Officers and non-commissioned officers can be employed with full advantage on the recruiting service, and that, while recognizing exceptions, young Officers and men will be unsuitable, and outside civilians wholly unreliable. Of course young men as well as old can be found with exceptional aptitude for this as for other duties; nevertheless on broad grounds I think it most desirable that only tried and specially capable medical and field Officers and sergeants should be employed at all our larger recruiting centres; and, having found such men, I would give them large discretionary powers.

It is astonishing what diagnostic skill long training will bring to the eye merely. I know a most expert lame cattle dealer, who, from being unable to leave his cart, never handles, but judges cattle driven past him with unerring precision, as regards condition, quality, and weight, by sight alone. So, the apt recruiter in time acquires a similar eye for the human animal, and becomes educated visually so as to be able to estimate with much ready accuracy the measurements and physical quality of the naked recruit; he, in short, grows into an expert, and therein is his great value.

I would impress on you the especial value of expert medical examination, both in protecting the Service against inefficient men, and the State from much financial loss. It is, I think, a most mischievous mistake to imagine that any young army surgeon or civil practitioner is competent to examine recruits, merely because he is a medical man; the services of such inexperienced and untrained men may be cheap at the time, but will infallibly prove very dear in the end.

I have often thought that were it possible to give our young army surgeons a short practical insight into recruiting at our larger centres it would be of much advantage to the Service and to themselves. It would give a confidence which I know is often wanting when passing recruits on their own responsibility, and probably also prevent the rejection of eligible recruits whom the inexperienced examiner pronounces unfit through an uncertain and too literal interpretation of the Regulations.

During the past decade medical examination has become more exact and scientific; when I joined the Service it was indeed crude, superficial, and perfunctory. The thorough and skilful examination of a recruit is no mere mechanical formula like drill, but involves the expenditure of considerable physical and mental power. After two or more hours at the duty it is difficult to keep up the close attention and alertness of mind necessary in playing the part of a medical detective. It must not be forgotten that the recruit and the doctor are, as it were, pitted against each other, the one trying probably to conceal, the other to spy out, defects. It is a situation and an ordeal not altogether calculated to maintain amicable relations between them; against the recruit's stupidity or obstinacy, conscious or unwitting concealments, or even deliberate attempts to deceive, the medical Officer has to bring skill, patience, good temper, adroitness, and finesse. No small degree of physical and mental endurance is indeed required by medical Officers who have to examine a large number of recruits on end. I have been asked how many I could examine in an hour or a day. This is a question not only foolish but vulgar. It implies that professional work can be measured by the same standard as mechanical piece-work. In this instance it would involve a mere race of numbers against time, altogether without reference to the quality of the work.

It of course takes considerably longer to pass a man, take down all his marks, and carefully prepare his documents and records, than to summarily reject him; but I would certainly not expect even an

expert examiner, aided by the best clerical and other assistance, to pass more than six or eight recruits in an hour. Medical examination cannot be hurried without danger of important slips and mistakes.

It is astonishing how little is generally known of the nature or extent of the medical examination which a recruit undergoes. I have been asked, by those supposed to know better, whether we wholly stripped recruits. I imagine the female recruit who lately presented herself must have been profoundly ignorant on that very point!

I would ask you to believe that a vast amount of painstaking work is done by Officers and men engaged in recruiting, of a kind which never obtrudes itself publicly, and may be even not wholly known to their immediate superiors. For the expert medical and field approving Officers are like sentries on the portals of the Army, and by skill, discrimination, and vigilance, stop the entry of unsuitable or fraudulent men into its ranks: they are thus also truly guardians of the public purse. The importance of well done recruiting work may not always be fully appreciated or recognized; while the inevitable occasional oversights and mistakes are liable to be unduly magnified and too unbendingly dealt with.

With these general remarks, I would now ask your attention to some statistical and specific details of the recruits examined for all branches of the regular Army, and for several of the metropolitan regiments of Militia, at the great headquarter establishment at St. George's Barracks, London, which is by far the largest recruiting centre in the kingdom.

I take statistics for the past four years, 1885-88, inclusive, because I can speak from personal knowledge of the recruiting during these years.

I first direct your attention to the recruits for the regular Army, as shown in Table I.

The numbers inspected, passed, and rejected are shown year by year, with the percentage of rejections.

TABLE I.—*Recruits Inspected, Passed, and Rejected for the Regular Army at St. George's Barracks, London, for the Years 1885-88.*

Year.	Inspected.	Passed.	Rejected.	Per cent. rejections.	Average.
1885.....	6,149	3,227	2,922	47·51	} 47·17
1886.....	6,314	3,345	2,969	47·02	
1887.....	5,017	2,709	2,308	46·00	
1888.....	5,997	3,111	2,886	48·12	
Total...	23,477	12,392	11,085		

Average rejections on enlistment throughout the United Kingdom for same period, 43·42.

I first observe, in connection with this table, that it is the total inspected which represents the actual labour of the medical Officers.

and sergeant recruiters; for the description and measurements of all recruits, rejected as well as passed, have to be carefully recorded and tabulated for the purposes of statistical analysis.

Statistics connected with these 23,500 men inspected are much more uniform and homogeneous than those presented by recruiting Returns from the country at large, inasmuch as the recruits were collected within the same area, by the same sergeants, and examined practically by two medical Officers only. The yearly totals are much alike; but that for 1887 was lessened by the efforts of a branch and rival recruiting establishment then in operation at the Tower, but now discontinued. But, although annual totals closely correspond, London recruiting is not uniform at all seasons, but is automatically somewhat brisker in winter and summer. I cannot say why, but I have the assurance of the oldest recruiters, that it does not seem to depend on slack trade, or want of work; for such apparently do not materially affect the steady flow of recruits within the metropolitan area.

In the manufacturing and industrial districts dull trade undoubtedly quickens recruiting, but probably influences recruiting in London indirectly only; that is, by bringing about a somewhat larger enlistment of country lads, who in dull times come to town seeking, but not finding work.

The true London recruit, whatever may be his motive for enlisting, seems in no great hurry to join; for he is easily distracted; all outdoor excitement, such as holidays, demonstrations, races, and sports, at once and for the time being lessen or almost stop recruiting.

Not merely are different months slacker or brisker than others, but different days of the week likewise; the three first are always busier than the three last; this is probably from the fact that men usually finish up, or get discharged from work, at the end of one week, and so are able to enlist at the beginning of the next. Although London recruiting, like all else connected with such a great place, is of a decidedly cosmopolitan character, and embraces men from every part of the country and the world, yet quite two-thirds of the total recruits are declared natives either of the greater metropolitan area or of the districts immediately adjoining. From an analysis of the recruit registers and annual Returns, and by striking averages, I find, as shown in Table II, that of the total English recruits about 63 per cent. belong to Middlesex and Surrey, 11 to Kent and Essex, and 26 to the rest of England and Wales. I need not say recruits do not always give correct accounts of their birth-places, any more than of their ages or employments; but in the great majority of instances these particulars are doubtless given truthfully enough. It does happen also that recruits born out of London belong to it all the same from having been reared in it; but against such can be put the undoubted country lads bred outside of London in the four home counties named; placing these to balance each other, it may be roundly estimated that London recruits are made up of 60 per cent. urban and 40 country-bred. The numbers of Scotch, Irish, Colonial, and foreign London recruits, although considerable, are relatively small. The Colonial are largely the sons of soldiers born abroad.

TABLE II.—*Nationality of Recruits for the Regular Army inspected at St. George's Barracks, London, during four Years, 1885–88.*

	1885.	1886.	1887.	1888.	Total.
English.....	5,763	5,846	4,772	5,706	22,084
Scotch.....	139	169	80	118	506
Irish	189	219	85	115	608
Colonial and foreign..	58	83	80	58	279
Total	6,149	6,317	5,017	5,997	23,477

Of English recruits, average per cent. from the following localities, according to declared birth-place:—

Middlesex and Surrey.....	63·57	} 100·00
Kent and Essex.....	10·97	
Rest of England	25·46	

London recruits are drawn from a greater variety of classes in the social scale than in provincial centres; yet, the proportion from the various classified trades and callings in recruiting Returns is much the same as in the country districts; the chief exception is a considerably larger number of the professional and clerk class.

As shown in Table III, half are drawn from the unskilled labour class; but the great term “labourer” is not only freely used but much abused in recruiting Returns; it is often applied simply in default of any other nameable calling, and I have known it assumed by a clerk, and even a professional man, to conceal identity.

TABLE III.—*Occupations of Recruits inspected during 1885–88, for the Regular Army, at St. George's Barracks, London.*

	Inspected.	Rejected.	Per cent. rejected.
1. Labourers, husbandmen, servants, &c. Proportion 51·31	12,057	5,324	44·14
2. Trades: bakers, tailors, shoemakers, printers, &c. Proportion 17·67	4,150	2,374	57·20
3. Mechanical employments: smiths, masons, carpenters, engineers. Proportion 15·66	3,677	1,934	52·59
4. Shopmen and clerks. Proportion 10·86 ..	2,555	1,195	46·77
5. Professional, students, &c. Proportion 2·20	492	153	31·09
6. Boys under 17. Proportion 2·30	546	105	19·23
Total.....	23,477	11,085	

A distinction is drawn in Returns between labourer and farm labourer, and it may excite surprise to learn that the latter term figures in London statistics. This is how it usually comes about. In autumn, or winter especially, it is not unusual for country bumpkins to present themselves in twos or threes from the same locality; when they do, poaching difficulties are generally at the bottom of the sudden migration; it is a joke of the recruiters to ask them whether they have not fled to London from the "pussy cat with the long ears!"

The unskilled class of carmen, carters, and van porters supply many good recruits in London; they are generally well developed and able bodied, probably from having originally been stout selected boys for the employment. The trades class, such as tailors, shoemakers, bakers, printers, and sundry indoor handicrafts, supply about 20 per cent., while the mechanics, such as smiths, masons, carpenters, and fitters, yield about 15.

But while many good recruits are obtained from these skilled classes, the ratio of rejections is very high, amounting to from 50 to nearly 60 per cent.; they largely suffer from varix, ruptures, spinal curvatures, general unsymmetrical development, and bad teeth.

Not a few, however, ranked under the trade or mechanic class are mere labourers, as when a recruit is described as a plumber, while he is only a mate, "carrying the fire."

The shopkeeper, clerk, and professional classes give a large number of very fine recruits in London, especially for the cavalry; not a few are gentlemen born and bred. The rejections are comparatively low, but many clerks are deficient in chest. When examining good specimens of this class, I have often said to myself, would that those who dwell upon the deterioration of our race were here, to see such splendid fellows in their natural buff!

The boys enlisted in London are mostly drafted from various industrial schools, but the majority, being sons of soldiers, come from the Royal Military Asylum at Chelsea.

I will now say something of the 12,392 men found medically fit: I emphasize the word medically, because it must not be supposed that all these men proved militarily fit; much may happen between the passing and swearing-in. After the severe medical weeding ordeal, successful recruits may still fail to satisfy the approving field Officers; their antecedents may be doubtful, or they may turn out positive frauds; or they may hold out for a corps not open; or they may simply repent, dress, and walk away. There is no hold on a man until he is finally attested, and often much waste occurs between being found medically and militarily fit; so, in the various ways I have indicated it comes to pass that the numbers recorded fit in the medical registers never do, and never can, tally with the statistics of the Staff Officer of those finally attested.

Elimination, therefore, is carried out in so many different ways, that less than one-half of the raw recruits brought forward by the recruiters ever become duly attested soldiers.

I now notice the medical rejections and the chief causes thereof.

The rejections on inspection at St. George's Barracks reached the high level of 47 per cent., as against an average over the whole kingdom by army medical Officers, during the same period, of about 44 per cent. The excess of 3 per cent. in London can be explained partly by the larger urban element among the recruits, but more, I imagine, by the greater strictness of the medical examination.

TABLE IV.—*Four chief Causes of Rejection at St. George's Barracks, London, during 1885–88.*

Total rejections, 11,085, of which from—

			Per cent.
1.	Defective vision.....	1,201	.... 10·84
2.	Under height.....	620	.... 5·59
3.	„ weight	1,401	.... 12·62
4.	„ chest	4,479	.... 40·40
Total.....		7,701	.... 69·45

According to Table IV, no less than 70 per cent. of the total rejections are included under four causes only. If these causes be duly examined, I think the erroneous inferences which have been drawn from the high ratio of rejections in recent years will not only be corrected, but altogether dissipated. I allude to the theory that the increase of rejections is the result of deterioration and degeneracy in the population from which recruits are mostly drawn. Such an inference I consider an entire mistake; the raw material of our recruits is as good as ever it was; and this is not merely my own assertion, but the unanimous opinion of our oldest recruiters, who ought to know. It was the change of system, and consequent alteration in the Returns showing rejections, which produced the great increase. Up to 1879, the standard height, weight, and chest measurement in recruits was considered a military, and not a medical matter; the Adjutants and Staff Officers were supposed to be responsible for standards, but in practice it was left to the sergeant recruiters; height was fairly taken, but there was no fixed minimum weight, and as for chest, it was unquestionably most loosely dealt with; there was, in fact, every financial inducement to slur over standard measurements.

Since 1879 these measurements have, very properly, been made part of the medical examination, and the responsibility for them has rested on the medical Officers. This is as it should be; for, not only are correct measurements a most important and essential part of the examination, as I will explain when speaking of their correlation, but the medical Officer is altogether the most disinterested and competent official to make them. To be under standard, in short, was formerly a military, but is now a medical disqualification, and the effect of the change is well shown in the statistics of Table V. In this, I have selected three years preceding and three following the change, and the result is an average increase in the latter of 18 per cent. in the

total rejections, almost entirely from under standard measurements. Before 1880, it is true, medical Officers did have some means of rectifying standards by the rejection of evident weeds, from "Muscular Tenuity and Debility;" but rejections under this head are now merged in the much more exact term—"under weight." The high ratio of rejections for under standard has been kept up during recent years from several causes; when the rejection of a recruit involved the recruiter in direct pecuniary loss, there was care not to put forward palpable weeds; but now, when rejections involve little trouble and no pecuniary loss, less caution is exercised in the primary selection, and a large number of men on the very borderland of deficient standard measurements are pushed into the inspection room, on the bare chance of their passing on the responsibility of the medical Officer. Rejections are needlessly swollen in this way, and I am probably within the mark in stating that they might be lessened 15 or 20 per cent. by more careful primary selection. But I fully recognize it would probably be impolitic to limit the freedom of the recruiters too far in this respect; for it is better to have an explained high rate of rejections than that probably good recruits should be punctiliously turned away before they reach the medical inspection room.

TABLE V.—*Medical Rejections per cent. from all causes at St. George's Barracks during the following Years.*

I. Standards a military qualification—

1877.....	27·98	} Average 28·97.
1878.....	27·94	
1879.....	31·00	

II. Standards a medical qualification—

1880.....	50·00	} Average 46·87.
1881.....	49·83	
1882.....	40·79	

The responsibility of the medical Officers for standard measurements, and the far greater exactness with which these are now carried out, together with increased strictness and efficiency in medical examination, are the true explanations of the recent high ratio of rejections—not the inferred degeneracy of the recruits. It is curious to note that little interest was taken in standard measurements whilst it was a military matter; but the moment it became medical, then medical Officers themselves, commanding Officers, gymnasium instructors, and others, suddenly developed an interest, and even inquisitiveness on the subject quite remarkable. I feel perfectly certain this awakened interest has been in every respect for the good of the Army.

I will now look more closely into the four chief causes of rejection: First, as regards vision. In the days of Brown Bess, when the British soldier was cautioned to reserve his fire until he saw the

whites of the enemies' eyes, good sight was of little value; but now, every advance in long-range arms of precision makes acuteness of vision more and more important. Mere myopia or shortsightedness is easily detected and tested by the recruiter; but there are other conditions of vision which require professional discrimination; a recruit, for instance, will see three or four test dots at the required distance, but any greater number become mixed up and indistinct; this indicates a limited accommodation, and inability to see objects out of a certain meridian or plane; it is a defect, but not usually a disability, although many recruits are rejected for it. I mention this just to show that testing of vision is a scientific, and not a rule-of-thumb business. My own observation is that imperfect or defective vision increases as we ascend the social scale; it is, on the whole, more common among the better than the lower class of recruits, and in town than the country.

Second, as to weight. To weigh a man ought to be within the capacity of any recruiter, yet we have many rejections on this score; recruits are weighed outside the medical inspection room when only partially undressed, and enough allowance is seldom made for clothes; this is corrected when they are put in the scales naked in the inspection room. From a physiological point of view weight for inches is of very great importance, as I will mention when speaking of correlation.

Third, as to height. Most people will, no doubt, say there can be little difficulty in ascertaining the correct height of a man under a standard arm, but in practice we find this is not so. The fact is, height in a young man is not an absolutely fixed quantity, but varies at times, and under conditions entirely beyond the voluntary control of the individual. It is generally greater in the morning than in the evening, and after prolonged rest in the recumbent position, simply from the expanded condition of the elastic intervertebral cartilages. Then, from voluntary muscular effort a tall man, particularly, can easily lengthen or shorten himself from a quarter, even to a whole inch. Height measurement is often vitiated from want of attention to small details; half an inch out or in will result according as the recruit stands on the sides or flat of his feet; or according as the spinal column is kept straight or not, or the chin down, by which the true vertex of the head comes under the standard arm. Many a needless and barren dispute as to a recruit's exact height has resulted from want of attention to minor details in measurement, as well as from ignorant non-recognition of the simple fact that, after all, the erect human body is a living structure liable to vary, and not a cast-iron column.

Fourth, as to chest. This has been a bone of contention, and the cause of more interminable recruiting disputes than all others combined. From the point I have now reached, after years of dark groping, I look back upon the vast mass of chest measurement disputes I used to come across in the War Office, as not merely altogether unnecessary and unprofitable, but very unscientific.

I believe that endless misunderstandings have arisen over the

really simple matter of chest measurement through striving after a minimum, which, if it exists at all, is only of theoretical and not of practical value. What is it we want to ascertain in measuring the chest? Just whether a well-developed heart and lungs are contained in a chest roomy enough for their free play. The thorax is not to be girthed like a rigid box, but measured as a mobile living structure, constantly varying its capacity by the action of both voluntary and involuntary muscles. I see no practical advantage in trying to find out its scientific minimum, unless it be to estimate its greatest range of expansion, for it is the latter which shows capacity for sudden or sustained effort, as in running, just as the highest boiler pressure indicates the full working power of a steam-engine. I consider that the extent of mobility is of more practical value than the absolute minimum or maximum of the chest, and so would estimate an expansion of from 33 to 36 inches to be as good, if not better, than one of from 34 to 36 inches.

The Army Instructions how to obtain minimum chest measurement are, that the tape being adjusted, the recruit is directed to count ten deliberately, after which, the lungs being emptied of air, the minimum is reached and can be read off. Even supposing this method theoretically sound, it is beset with much practical difficulty, for it assumes the recruit to be a willing co-operator in the manipulation, which he seldom or ever is. On enlistment the recruit is always ready and willing, nay, even proud, to display his full chest expansion, but struggles, generally with success, against showing its minimum. Now, taking advantage of this almost turkey cock pride, I think I can give a ready key to the true and natural—not forced—chest minimum.

From a vast number of observations, I reckon the maximum expansion of the chest of a man of average size, between 18 and 25 years of age, to be about 2 to $2\frac{1}{2}$, rarely 3 inches. Acting on this fact, we have for some years at St. George's Barracks applied it in a practical way in measuring the chest, with such success that our measurements are now seldom challenged. The method is as follows:—On carefully adjusting the linen tape (steel tapes are unhandy and unsatisfactory) over the point of the shoulder-blades behind and above the nipples in front, the recruit is directed to take a deep breath and expand himself to the utmost; this done two or three times, the maximum expansion is ascertained; we have then no occasion to engage in an irritating fight for the minimum, because we have already found that, by deducting 2 to $2\frac{1}{2}$ inches, according to the height and general physique of the man. The minimum and maximum are then recorded above each other, as $\frac{33}{5}$ or $\frac{34}{6\frac{1}{2}}$, as the case may be.

I think if this simple and natural system were adopted, and the maximum and minimum recorded on documents, many of the absurd disputes over chest measurements which now take place would be altogether avoided and prevented.

I place no practical value on half inches out or in, and as for quarters, they are utterly absurd refinements in measuring, brought about by the slightest tightening or loosening of the tape.

The correlation of height, weight, and chest measurements are, as Sir William Aitken in his work on the development of the recruit has ably pointed out, of very great importance in estimating physique as a whole. Unless they are all in substantial accord, physical development is faulty. Sometimes, for instance, we find a fair chest with poor weight, which means bad development of the limbs; and again heavy lower extremities with very deficient chest, a combination not infrequent among clerks. Good weight for height is of the first importance, because without it there can be no really robust physique, however elegantly fashioned the different members may be. I am not thinking of weight from fat, for of that we see little among recruits, but weight from a stout bony framework well clothed with muscles. We do not take men for the regular Army under 115 lbs. weight at present, but I think this is a low minimum for lads of 5 feet 4 inches for infantry, and altogether too little for mounted corps. But as the majority of recruits at 115 lbs. are not more than 32 inches chest, and therefore under standard, they are rejected on that score. For mounted corps I consider the minimum should be 125 lbs., which would seem the lowest weight to give a cavalry soldier power at once to control his horse and wield his weapon, or a driver strength to manage a pair of horses. The height for artillery drivers has lately been lowered to 5 feet 3 inches, in the hope of thereby tapping a sturdy stratum of the population which undoubtedly exists at that height; but to catch suitable men, weight should have been raised to 125 lbs.; for the mere lowering of the height without increasing the weight will not secure the sturdy, but only open the door for stunted men. For nothing are strong lads more wanted than drivers. I have seen a driver obliged to struggle with a pair of restive horses until the skin was torn from his hands.

I think it can be amply shown that a close correlation exists between the physical and moral development, as seen among inferior races and the lower orders of men. Students in anthropology have long recognized it, both in savage and civilized countries. If it be true, then lowering the physical also means lowering the moral standard in recruits. I do not mean to imply that a short recruit has necessarily a "double dose of original sin," but rather that stunted growth usually means a low development of the nervous centres, and consequent deficiency in intellectual and moral power. We are bound to recognize the fact that a high standard of *morale* in an army is always associated with good physique. My friend Brigade Surgeon Beattie, Assistant Professor at Netley, a man of great observant powers, writes to me on this point as follows: "There is a close relation between steadiness of nerve and physical development; a soldier should literally have 'stomach for the fight.' If we dip too low for our recruits we shall be liable to get them not only small but unsteady, wanting in mental ballast as well as physical weight. The nerves and muscles are built up by the same process

of nutrition, and the weighing machine is the best of all means we have of testing the general fitness of a recruit."

I now pass to another point, and that is the motive which induces or impels recruits to enlist. Surgeon-General D. A. C. Fraser, when employed on the London Recruiting Staff some years ago, collected data on this subject which I have seen. I have not collected any in a formal way myself, but speak more from general impressions, obtained either through a little quiet cross-questioning, or from purely voluntary and confidential statements made by recruits of their own accord. I sum up reasons for enlistment under four heads, in the following relative order of precedence:—

1st. From choice; desire to be a soldier, see the world, and better oneself.

2nd. From necessity; want of work, or difficulty in re-obtaining it if discharged through some fault; sheer want.

3rd. Desire to leave home from domestic or social difficulty with family or friends, and especially sweethearts.

4th. Minor troubles with the law and the police.

In reference to law-breaking in general, I am often asked whether a large number of very bad characters do not enlist in London. Well, we do our best to prevent them if they try; but I think Colonel Henderson and the recruiting staff will support me in saying that the London recruit seems as law-abiding as the mass of his country compereers. He is generally glib-tongued and often foul-mouthed, which does not enhance his outside reputation, but such faults are mostly on the surface.

But one thing is certain in the knowledge of all concerned, that very few true London criminals, or specimens of the habitual gaol bird class, ever venture near the recruiters; such men avoid and hate military discipline quite as much as police surveillance.

This leads me to speak of a class, not strictly civil but military offenders, who give much trouble in all recruiting establishments, and especially in London. I mean men who fraudulently re-enlist, either once in a way or repeatedly. Many such Frauds—and that is the best substantive name for them—attempt re-enlistment in London under the impression that they are more likely to escape detection in such a vast place than at out-stations and depôts; therein they completely err; for in London they but fall into the hands of the most experienced Officers and men, who make a study of recruiting and are thoroughly conversant with fraud in all its aspects. Through the kindness of Colonel Henderson I am able to show in Table VI the number of frauds detected during the past two years, in which records have been kept, at St. George's Barracks. They averaged 120 a year, but for every one of such at least three or four were baulked or prevented, making the total detected and suspected frauds probably 500 a year, which shows the extent of the evil. The detected frauds are those against whom direct evidence transpires, or who confess; the suspected, but who escape, are those against whom, while undoubted frauds, no legal evidence is forthcoming. At St. George's Barracks we pride ourselves in the prevention of fraud;

nevertheless it succeeds in a very small number of cases, as shown in the disallowances, that is, frauds detected within twelve months of being posted to regiments, in the second part of the table. Such men form a mere decimal fraction of the men posted from St. George's Barracks, but I am informed the disallowances against many recruiting depôts in the country are very heavy.

TABLE VI.

Fraudulent enlistments discovered at St. George's Barracks, London, during—

1887.....	97	} Average 120.
1888.....	143	

Fraudulent enlistments not detected at St. George's Barracks, but afterwards discovered in regiments, and disallowed for :—

1885.....	14
1886.....	19
1887.....	40 (Jubilee pardon year).
1888.....	10

In London we have not only to contend against frauds from every branch of the Army, and from all parts of the kingdom, but against frauds from the Navy and Marines as well. The men who fraudulently re-enlist are almost wholly of four classes—deserters; men discharged as worthless; men discharged as invalids; and men in the Reserve.

I will give some account of these frauds as we find them stripped in the inspection room; and let me remark it is sometimes easier to spot them when dressed than when naked, and *vice versâ*. It is very difficult to describe the appearances and signs which give rise to suspicion when an apparent fraud enters the inspection room. The experienced medical Officer arrives at a conclusion less by reasoning than by what may be termed an instinctive and unconscious cerebration. Conscience as a rule “doth make cowards” of frauds, and they almost invariably have a furtive look and manner; sometimes they will try to conceal a military bearing and knowledge of drill by overdone and over-acted awkwardness; they generally call themselves younger than they evidently are; are not very coherent in any account of their antecedents; and give a false birth-place, which speedily appears when a few simple questions are asked as to its geography and topography. When a suspected fraud enters the room we have signs and passwords which put all on the *qui vive*, and when he leaves, the sergeant-major and Staff Officer outside are put on their guard. Sometimes during examination giving a sudden word of military command will throw the fraud off his guard and cause betrayal of himself; sometimes he will scent detection the moment he enters the room, and endeavour to escape by pretending he cannot see the test-dots. But not a few frauds are just as wily and wary as their

examiners, and by dint of plausibility and audacity baffle all suspicion and get through. I have heard Officers say there could or should be no such thing as a fraud getting through; such men can have no practical knowledge of recruiting.

As regards the detection of fraud through marks, there is a good deal to be said for and against. Re-vaccination marks when present are of undoubted value, for such can nearly always be distinguished from marks of primary vaccination in infancy. It has been proposed to effect re-vaccination in such a way as to thereby mark recruits for identification, but I think any such avowed object would be wrong, as tending to bring a most salutary operation into disrepute; besides, upwards of 40 per cent. of re-vaccinations either fail or leave no indelible marks. Birth marks, scars, and tattoo markings are all of value as means of identification, but they are often most loosely described.

I find that no less than 58 per cent. of the recruits passed at St. George's Barracks have tattoo marks of some kind or another. That shows the custom of tattooing is at once common and popular; and I believe hardly a single man would object to have a Service device, such as a crown, tattooed on him after enlistment. The objection to marking by this means would come from humanitarian civilians, who choose to misname tattooing, and call it "branding."

When we come across elaborate tattooing, in which different coloured pigments have been used, whether the devices be oriental or not, such artistic work almost invariably indicates the bearer had been in Burmah or China. He may have been a merchant seaman, but is more probably a fraud from the Army or Navy. During the last two years a rather elaborate register of deserters and frauds has been periodically issued from the War Office; we occasionally detect a fraud through it, but it embraces many thousands of names, and is much too vast to be of handy use; besides, many of the markings given are of no value, being common to multitudes of soldiers. The register is also issued too much in arrear of desertions. The great bulk of deserters, if they attempt re-enlistment at all, generally do so within a very short time of their disappearance, generally within a few days or weeks. Staff-Sergeant Mister, who has devoted much attention to the matter, thinks publicity connected with deserters would be best attained by a bi-weekly issue of the "Police Gazette." The information therein given he thinks should be amplified according to the amended form shown in Table VII. He thinks information should be supplied regarding date and place, and by whom the deserter was enlisted, also the vaccination marks borne on desertion. This old non-commissioned officer's recommendations are founded on such long and accurate experience as to make them well worth consideration.

TABLE VII.—Improved Form for use in “Police Gazette.”

Name.	Regimental No.	Regiment or corps.	Age.		Height.		Description.			Trade or occupation.	Date of enlistment.
			Years.	Months.	Feet.	Inches.	Complexion.	Eyes.	Hair.		

By whom enlisted.	Place of enlistment.	Place of birth.	Vaccination.		Desertion.		Marks and remarks.		
			On enlistment.	On desertion.	Date.	Place.			
			Right arm, No.	Left arm, No.				Right arm, No.	Left arm, No.
		Parish, town, or county.							

TABLE VIII.—*Militia Recruits Inspected and Rejected at St. George's Barracks, London, during 1885-88.*

Years.	Inspected.	Rejected.	Rejections per cent.	Average.
1885.....	2,957	1,188	40·17	} 35·52
1886.....	2,419	984	36·52	
1887.....	604	213	35·28	
1888.....	2,847	858	30·13	
Total	8,827	3,243		

I will now offer some remarks on militia recruiting. Recruiting was opened at St. George's Barracks some years ago for the Middlesex regiments at Hounslow, and lately for the Surrey Militia at Kingston, with the best results, although of course much increasing the labours of the recruiting staff. During 1885-88 a total of 8,827 militia recruits were examined, as shown in Table VIII, but during the greater part of 1887 recruiting was stopped. The average rejections were 35·52, against 47·17 per cent. for the regular Army; this is easily explained by the lower standard required and wider net spread. The minimum chest is 32 inches, and weight 110 lbs., while growing lads at these measurements under eighteen years can be passed at 5 feet 3 inches. The wider discretion given to approving medical and field Officers towards the militia works very well, and I should like to see a like discretion given towards recruits for the regulars.

Militia recruits are mostly drawn from the same classes as the line, but are younger and less developed; a large number enter with the avowed intention of joining the line the moment their age and standard will admit.

In this way the militia is truly a nursery for the regulars, and I think most properly so, although I am aware many are opposed to the system.

On an average of four years 523 men annually joined the regulars at St. George's Barracks from the militia. A very considerable proportion of these men had also joined the militia at the same place, so that we are able to trace them and note the effect of training. With this view I picked out fifty lads who during the past year had twice passed through our registers within three months. I made a limit of that period because it was short, and embraced the training of fifty-six days, and therefore fitted to bring into relief the actual effects of the training. The results are shown in Table IX, and I think are of a very satisfactory kind.

TABLE IX.—*Return showing Effects of 56 days' Training on 50 Recruits who enlisted into Militia and Regulars within 3 months.*

Average of days between enlistment, 69.

Average age, $18\frac{5}{12}$; oldest $20\frac{8}{12}$, youngest $17\frac{0}{12}$.

Average gain in *Height* during period :—

Maximum.....	$\frac{10}{16}$ inch (2 men).
Minimum.....	0 „ (15 „).
Mean	$\frac{3}{16}$ „

Average gain in *Weight* during period :—

Maximum.....	16 lbs. (1 man).
Minimum	0 „ (1 „).
Mean.....	$5\frac{1}{2}$ „

Average gain in *Minimum Chest* during period :—

Maximum.....	2 inches (1 man).
Minimum	0 „ (6 men).
Mean.....	$\frac{1.2}{16}$ „

Average gain in *Maximum Chest* during period :—

Maximum.....	$1\frac{1}{2}$ inches (3 men).
Minimum	0 „ (5 „).
Mean.....	$\frac{1.4}{16}$ „

The broad conclusions to be drawn from such figures may be recapitulated thus:—

Many growing lads of about eighteen years of age, ambitious to be soldiers, but unable to join the regulars straight away, take a training in the militia, and through that are so improved in physique as to be able to enter the line at once on its completion. The good effects of militia training are not only physically but morally evident in the vast majority of cases. Not only is weight and chest, and even height, increased, but there is a marked improvement in general smartness and intelligence, as well as in sense of cleanliness and self-respect. Such indeed are the manifest advantages of a two months' training that I think even a peace philanthropist, did he but know it, might rightly wish the militia made a great school for the improvement and elevation of the masses.

From a recruiter's point of view the militia is a most excellent stepping-stone and real adjunct in recruiting for the line. Recruiting for both branches should, I think, always when possible be conducted together, hand in hand, and under no circumstance carried out in any kind of rivalry or antagonism.

We find, for instance, almost every day that a recruit under standard for the line there and then joins the militia when it is pointed out to him that it is the proper thing to do in order to make

himself bigger and stouter. But for dual recruiting carried on in this way in the same place, such recruits would probably be lost to both branches.

I always feel, in examining a militiaman who has gone through a training and is joining the regulars, that I am handling a man already raised above the level of the raw recruit; a ready made and potentially efficient soldier, not likely to repent and give the trouble which repentance brings, for a large number of recruits join the militia experimentally to see whether they will take kindly to soldiering or not.

I find I have reached the limits assigned to papers like this. My remarks have necessarily been somewhat discursive, but I trust, nevertheless, have conveyed some information not usually readily attainable.

If my observations should bring about certain alterations, which I think would be improvements, in the Recruiting Regulations, I shall be satisfied.

Major-General DASHWOOD: My Lord and gentlemen, I should like to offer a few remarks as to the inducements which are offered to recruits to enter the Service. As far as the daily pay of the soldier goes, I do not think it should be altered, but with regard to other advantages besides the pay I think a great deal might be done. I allude especially to the employment of the soldier after having left the Service. At the present time the authorities do very little in this way at all. The corps of Commissionaires, I believe, is entirely self-supporting, so also are the registers at the brigade depôts for the employment of soldiers, which, however, have not been altogether a success, because you cannot get employers of labour to employ a soldier instead of a civilian where the civilian is the better man of the two. The soldier may have got rusty at his craft, if he formerly learnt one, or he may be liable to be called upon as a reserve man to leave his work, which would be inconvenient; and, therefore, you cannot expect employers of labour to select a soldier as against a civilian if so doing would be detrimental to their business, because they would thereby be suffering an indirect form of taxation, which we have no right to call upon them to do. The reason why the Government hitherto have never done very much for securing berths for men in the enormous number of places for which soldiers would be available is that it would mean a sacrifice of patronage, or, as it is very often, jobs. Not very long ago an old soldier employed at one of the public offices, a man with several medals, happened to die; he was replaced by a very imposing looking individual, who was asked by a gentleman connected with the office how long he had been in the Service. The man replied twenty years. "Oh," he said, "what corps were you in?" The reply was, "I was twenty years butler to Mr. Ward Hunt." Not long ago a friend of mine told me of another case of this description in which, on taking over an office, he was recommended strongly to keep a man in the same employment. However, he found out that this man, so far from being a soldier, had been footman to some Commissary-General. In this case I am glad to say the footman was sent about his business, and in his place an old soldier was substituted. There are, of course, a large number of berths which Government might, if they liked, and if people would be willing to do away with patronage, give to soldiers. There are a number of berths, for instance, in the Customs, Post Office, and public offices; if all these were reserved for soldiers, and, in fact, it was ordered that no man should be eligible to hold any of these situations unless he had served six years in the army, that would be a very great inducement for men to enlist. A man would know then when he was recruited that if he served six years and was well behaved, he would have a pull over a civilian. Now it is rather the other way, because very likely when he leaves the Service he is rusty at his trade, if he has one, and the mere fact of his being in the reserve, and therefore liable to be called

out, is detrimental to him. I do not know whether I am out of order in talking a little further about the conditions of the Service, but there is another matter that I think is very detrimental, and that is, it says that a man may be allowed to re-engage for certain terms of service up to twenty-one years. I should like to see that word "may" replaced by the word "shall," provided he is medically fit and is recommended by his commanding Officer, because soldiers are not fools, and they know when the word is "may" that, supposing something was to happen and the clouds were very clear on the political horizon there might be a reduction of some sort, and he might be thrown suddenly on his beam ends. Further, when a man re-engages for a term of service from six to twelve years, and from twelve to twenty-one years, he should have an increase of pay, and deferred pay should be done away with. Deferred pay now merely acts as an inducement to leave the Service, and not to re-engage. Of course we do not want every man to re-engage, but still what happens is, a reserve man leaves the Service, gets his deferred pay, and soon becomes penniless; he cannot come back to his own regiment unless he pays back the money, and the result is he fraudulently re-enlists in another corps. I should also be in favour of all men serving either in the reserve or with the colours for twenty-one years, and at the end of forty-two or forty-three years, or some such age, he should receive a deferred pension according to the time he has served with the colours; that would be a retaining fee, and would keep him in the reserve. At the present time we are told very often that there are very few men in the reserve, when they are called out, who do not come forward; at the same time there are a number of men who are not in receipt of reserve pay because they have given it up altogether, and have gone to the Colonies or the United States. Under such regulations a man would know that at all events he would not end his days in the workhouse, which many a good soldier comes to at the present time.

Brigade-Surgeon MYERS, Brigade of Guards: I think Surgeon-General Don has scarcely done himself justice as to the work performed at St. George's Barracks with regard to recruiting. If one looks at the tables it would appear that there is only a difference of about 4 per cent. between the rejections at St. George's Barracks and the rejections throughout the Service. It struck me since I have been in this room as very remarkable that there should be such a small difference. No doubt, as he says, there is a tendency for weak recruits to try and join in London, and that might almost alone account for the difference. It must also, however, partly arise from the fact that there is a more careful examination. Now in such a department, with such an enormous number of recruits passing through their hands, the recruiting staff must have immense and most valuable experience, and therefore it seems rather difficult to understand how it is that there is so small an apparent difference between the average rejections there, which might be credited to greater care, and the general average of rejections throughout the country. I should like to ask Surgeon-General Don if he has made any inquiries into the amount of losses of recruits during the first three months, because we all know that ominous yellow form which is used for the discharge of recruits under three months' service as unlikely to become efficient soldiers. I believe, but I do not know, that those men who are discharged under three months as unlikely to become efficient soldiers, come under the term "rejected recruits," although they do not appear in the statistics brought forward by Surgeon-General Don. They are not invalided. I fancy if the statistics were worked out, Surgeon-General Don and his colleagues might find a much greater loss of recruits "under three months" passed out of his district than in it. I should also like to know what is the loss to the Service from other reasons than medical during the first three months, because it is an extraordinary thing that in every hundred men fifty practically are lost in this first examination alone. What is the loss beyond that? I wish to come now to another point where I must differ from Surgeon-General Don. If there is one thing a medical Officer ought to be able to do, young or old, he ought to be able to examine a man and know whether he is healthy or otherwise. I admit that experience will enable you to form an opinion almost at first sight, which perhaps a young man might not be able to do, but still if a medical Officer cannot tell whether a man is in good health or not he is not fit for the Service. I was sorry almost when medical Officers ceased to have to pay for inefficient recruits. I think as to some recruits I have seen brought before me at the dépôt

at Caterham, that if I had been in authority I should have made the medical Officers pay for them, because they could not have examined them properly or they would not have passed them. They have signed papers, but they could not have examined them, or if they had it was done with their eyes shut, but I should add that such instances have been rare. With regard to the measurement of the chest of recruits, I venture to think Surgeon-General Don does not read the Medical Regulations as they are intended to be read. He says, "The Army Instructions how to obtain minimum chest measurement are, that the tape being adjusted, the recruit is directed to count ten deliberately, *after which, the lungs being emptied of air, the minimum is reached* and can be read off." I do not think we quite agree on that point. I maintain that the Medical Regulations never intended that the minimum chest measurement should be taken. The wording is not that. It is to this effect: "The recruit shall count ten slowly, and the minimum measurement shown by the tape while so counting is to be taken." That is a totally different thing from saying that the minimum chest measurement *is reached* and is to be taken. If any one of you like to expand the chest to the fullest extent, as the recruit generally does if told to count ten, you will find you can count ten without the slightest contraction of the chest, and you can count twenty without another inspiration, so that I think it is clearly intended that a man's normal chest measurement should be taken, not the minimum chest measurement, but the minimum measurement after the man has counted ten, which is a totally different thing. If a man can ordinarily count twenty at one inspiration, then the minimum recorded at ten would be about the normal chest measurement. Surgeon-General Don's suggestion, however, of taking the maximum and the minimum, and hitting off the medium, is a most practical one. Few men can measure chests exactly the same, you want a practical man to do it. The words of the Regulations are very carefully drawn up; and it would be difficult to describe more clearly what is required according to the method adopted. With regard to re-vaccination, I cannot think that there should be so large a proportion of failures as 40 per cent. I have re-vaccinated some thousands of recruits, and certainly I hope my failures were not nearly 40 per cent., at least I do not believe so, and I should like to ask Surgeon-General Don whence he obtained his statistics on this point.

Brigade-Surgeon G. C. GRIBBON: My Lord and gentlemen, I do not think I can let pass this opportunity of expressing my hearty concurrence with all that my colleague, Deputy Surgeon-General Don, has said. Working with him in the same area, I think he has given you a most excellent paper. However, I do not wish to occupy your time with remarks of this sort, but shall pass on to one point, in which he speaks of the class of clerks. He says that many clerks are deficient in chest measurement. Now my experience of clerks is this, that they are either very good or very bad. Certainly the bad ones are very deficient in chest, but we get extremely good ones, very superior fellows indeed, and I must tell you my impression that these in nearly every case belong to the volunteers, which I think shows what value military training is to that class. After a day's work with his chest over a table writing, there is nothing better for a man than to go in the evening to the drill shed or parade ground and have his chest well thrown out. The deterioration that Surgeon-General Don speaks of here I apprehend refers to the town lad now and the town lad of the past. There is no doubt that as cities grow, and the open fresh air of the country gets further and further off from the densely inhabited portions, there will be a tendency to deterioration in the denizens of those parts who pursue indoor occupations, but in opening up air spaces in large cities, their lungs, so to speak, in the improved workshops and dwellings, in the shortened hours of work, and the greater devotion of the lower class to outdoor recreation, such as cricket, &c., we find, I think, that there is a sufficient counter-action to this tendency to deterioration. Comparing the town lad and the country lad, there certainly is a distinct difference between them, and we know in the recruiting office a country lad immediately he comes in. He is so very different from a town lad. His bones are large and thick, and they have a good covering of muscle, and his heart acts quietly, whereas in the town lad the bones are smaller, and he has not infrequently a want of symmetry in the legs, and perhaps some slight deformity in the bones as well. There is one thing especially characteristic of the town lad, and that is, that his circulation is worked at high pressure, so to speak. Among the lower city classes

there is a tremendous wear and tear of the nervous system, and this must necessarily lead to its being prematurely worn out. That is an essential difference between a town and a country lad, and I think one great cause of this undue wear and tear is the late hours the lower classes in the towns keep. There are the attractions of music halls, &c., to keep them up late. On the other hand, the country lad has nothing to do of an evening, and so goes to bed early. There is only one other point to mention, and that is the order of precedence as regards the reasons of enlistment. I think I should put first, necessity or want of work. My experience is that this is really the first cause. The fellows who come to us want a square meal, and board and lodging; that is the first thing they want. I think as regards Brigade-Surgeon Myers's criticism about the measurement that it is a mere verbal one. No doubt the minimum, as expressed in the Regulations, is the minimum after the ten is counted, and that practically is the mean measurement. The minimum measurement of course, strictly speaking, is when the chest is empty of all but the residual air, which you cannot get rid of, but Surgeon-General Don, as it seems plain to me in his remarks, takes the expression from the Medical Regulations, and uses it with the meaning attached to it there, *i.e.*, as the practical minimum or mean.

Lieutenant-General Sir R. BIDDULPH: I should like to make a few remarks in consequence of my having had something to do with these matters for two years, though that is now past. I think that what Dr. Don has suggested in regard to the chest measurement is extremely valuable, because it will be found practically, if I may say so, that it is one of the greatest difficulties to get two doctors to agree in a chest measurement. During the time I was Inspector-General of Recruiting there were many such cases which were sent up to Headquarters, and recruits were sometimes rejected on that account. I agree with Dr. Don in saying that when they go into the refinement of a quarter of an inch in chest measurement it becomes absurd, because nobody can measure exactly to within a quarter of an inch; the recruit can alter it himself. But I think what he has said about taking the maximum, and then allowing a certain reduction in order to get the minimum, is the best way of doing it. From the experience I had in that office I found that most objections used to come from Officers who had not had practical experience in recruiting, that is to say, from Commanding Officers who perhaps had recently returned from India, had been out there a great many years, and had never had anything to do with recruits, because the men who go out to India are not recruits; it is by these Officers that objections are more generally made. The discharge of recruits under three months' service is a very important matter, and one to which the greatest attention was always directed in the office. No doubt there were a certain number of men pronounced unfit before the three months had expired; but the majority of these men were men who enlisted under the regulation which allowed men to be taken a little under the standard if they were promising. There was a regulation issued in the beginning of 1886, just before I joined the office, by which a certain latitude was allowed, so that they might take men a little under the chest measurement who appeared to be growing lads. Commanding Officers always had a great prejudice against those men, and when that order was cancelled in 1887, in consequence of our having a perfectly sufficient number of recruits without them, the number of three months' rejections dropped immediately. I think I mentioned it in my Recruiting Report for the year 1887, and I did so in consequence of the statistics that I received. There is another thing with regard to the militia recruits which I should like to mention, and that is, I think the latitude given by the Militia Regulations for enlisting men under the standard is very often rather abused. They read the regulation as allowing recruits to be taken not merely under standard of height and chest measurement, but allowing them also to be taken under age. Some Commanding Officers in the militia and some recruiting officers have practised that. The reason I object to it is this, that many of these young men join the militia with a view of trying how they like soldiering and going into the Army afterwards, and if they are taken under seventeen they cannot go into the Army for more than a year afterwards. What is the result? They know that they cannot pass from the militia to the line *bonâ fide*, so, in order to get into the Army, they must desert from the militia and enlist in the Army as recruits, stating their

age to be eighteen. It is a great mistake to allow anyone below seventeen to join the militia; there should be no latitude whatever. I do not know whether recruiting officers who have had to deal with this practically have come to the same conclusions, but that is the one I formed myself—that men were enlisted between sixteen and seventeen under that regulation. I do not know that there is anything else that I need particularly say except that I agree with Dr. Don as to the very great importance to be attached to weight. Of course the minimum of 115 lbs. for all recruits is an absurd minimum if you are to take a Life Guardsman or a heavy cavalry man, because he ought to be a great deal more; but I apprehend the time will come when we shall have a more regular restriction as to weight, in the same way as we now have for chest measurement. At one time there was only one chest measurement for all heights. We have got more particular now with chest measurement, and I apprehend in course of time we may get more particular with weight, so that certain heights shall entail certain weights. That is a matter which requires medical experience, and it is not a matter on which those who are not professional men can very usefully lay down any general rules.

Major DAVIDSON, R.A.: Surgeon-General Don has alluded to the excellent work done by the Medical Department in getting our recruits. At the same time he alludes with considerable praise to the militia as a nursery and a schoolroom for our recruits. I think the question of getting our recruits from the nursery might be extended to a very great extent. What we want is habits of steadiness, seeing that our men have to use quick-firing arms. I think Mr. Stanhope in his speech on the Estimates said that we were going to build new barracks as depôts, and so on, for a number of regiments in the country, and I question whether the system which has answered so admirably in the Navy should not be extended to the Army, and that we should, as the Navy do, get our recruits as boys and train them on ships. This is essentially a maritime country. A boy trained on a ship would learn to row, knot, and swim; such training would be the very best for a soldier. A ship would be the best possible school for such boys, and I would suggest that nearly all our seaport towns should have depôts of boys from fourteen to eighteen years of age being trained for the service of their country. This would do away to a great extent with the expense of the Recruiting Department and medical examination. Surgeon-General Don has shown you what a tremendous increase both in moral and physical growth takes place even in three months' militia training, and says that "even a peace philanthropist would, I think, hardly wish a better school for the improvement and elevation of the masses." Such a training has been proved to be almost self-supporting if run on proper lines, and it seems to me that the employment of our unserviceable ships for such purposes would be the cheapest thing, and the best means of ensuring discipline. I only throw out this suggestion, as Surgeon-General Don referred to a nursery for the regulars, and I believe it would be a most valuable thing for the Army and the country.

Major BARRINGTON FOOTE, R.A.: My Lord and gentlemen, I had no intention of entering into this discussion at all. I had not read the lecture before coming here, but as most of the discussion has come from those who supply recruits, I thought I might be allowed to say a word as a receiver of recruits, that is, as a regimental Officer. With regard to a town recruit and a country recruit, in my humble opinion, from the experience I have had, there is no comparison at all as to which is the better man of the two. Personally I hail with the greatest delight a thorough good countryman as my working gunner or driver. There is no question about it, he is in a more healthy condition, his muscles have been very much better worked, and altogether he is a more capable-bodied man than the average town recruit.¹ The depôt I am supplied from is at Newcastle. The recruits from there are, I think, a little weedy and pale-faced, many of them having been employed in mines, and they are certainly not in any way up to the average physical form of the few country

¹ I believe that for many years past, and indeed at the present time, the vast majority of the recruits for the Brigade of Guards come from the country; splendid able-bodied men, a certain proportion of whom become non-commissioned officers of whom any Service in the world might well be proud.

recruits that I got before, when I was at Aldershot, up to last summer. I was lucky enough to get a great many recruits from the country round. Now that I have gone to Woolwich I get none of them. The whole supply to my battery, which has been rather large within the last few months, has been from town recruits, and my opinion is that they are nothing like so capable as the country ones. Statistics show that the rural population is gradually disappearing, not very rapidly perhaps, but still the tendency of the people of England is to congregate in the large towns, so that, looking ahead, in a certain number of years we shall have apparently nothing but town recruits, and therefore the average man in the ranks—according to the arguments which we have heard this afternoon—the average run of men in the ranks will not be so capable as the average at present, unless of course we recruit under an entirely different system. There is one great thing within the last certain number of years which tends, I think, to make the working man less capable-bodied than formerly, and that is steam. I attribute the absence of steam, more or less, from his daily work as the real reason why the countryman is stronger than the town man. The latter has very little opportunity of using his muscles, and his body is not in such a healthy state, because instead of using his body he simply has to look after some steam management: he very seldom walks; railways take the place where ordinary roads used to exist. People in England used to be able to walk 20 or 30 miles, and think nothing of it; but nowadays there are very few who think of taking much walking exercise. If we were to take the whole of the men that one receives as recruits, and start them off suddenly—of course they improve afterwards—most of them would be really incapable of taking a thoroughly long walk. They do not walk nowadays, they go in the train; they do not work much with their arms or chest and improve their muscles, because of the introduction of steam. I take it, with the collecting together of all the inhabitants of England in large towns, and also the general introduction of steam and mechanical aids, that looking on a few years hence some other means will be required to supply capable-bodied men. We call our Army a voluntary army, but it is hardly that I think. I quite agree with one of the speakers, who said that the primary reason why men enlist is because they are in want, because they are in a state of hunger, and because sometimes they have fallen out with their employers, or are in want of employment. You can hardly call that a voluntary army. It is true they are not compelled to become soldiers, they are not seized upon physically, but they are practically compelled because they are in want, and have no work elsewhere. So I say that this, added on to the deterioration of physical power by men living entirely in towns and not in the country, it would appear to me that although we may be in a satisfactory state at the present moment, that if we look on a few years hence some other system, and possibly scarcely what will be called a voluntary one, will be necessary to keep our ranks supplied with men who shall be sufficiently capable-bodied, strong, and able to carry arms when required.

Surgeon-General DON: I thank you very much for the attention you have given to my paper, and for the kindly criticisms that have been passed upon it. At the outset I said I should not discuss the politico-economic aspects of recruiting, and therefore I do not propose to offer any observations on the last speaker's remarks; but I quite agree with him that no doubt the use of mechanical aids, steam, &c., has lessened the necessity for muscular hard work, and for the employment of the muscles, and has thus no doubt tended very considerably to deteriorate the physique of our workmen at large. Now, passing these points, I would reply to my friend Brigade-Surgeon Myers—it is not the first time I have discussed chest measurement with that gentleman. He says it is astonishing there should be only a difference of some 3 or 4 per cent. between the total rejections in St. George's Barracks and the rejections throughout the country at large; and he asks why that should be. But the difference of 3 or 4 per cent. is a considerable difference, and I suppose it is because we have got a little strict, indeed, we have to be more strict in London than in some of the country districts. Still the rejections at Liverpool, for instance, as I have been informed by the Officer commanding there, and in Manchester, and elsewhere, are really also high; but the generally high ratio of rejections in the urban districts are statistically diluted, so to speak, by the lesser number of

rejections in the country districts. Brigade-Surgeon Myers asks whether I included in my comparisons the losses during the first three months after enlistment. I have not. I purposely compared the proportion of rejections on primary examination only by the Medical Officer at St. George's Barracks and throughout the country at large, because I found that the secondary rejections of recruits passed by civilians were so high that, if included, they vitiated the statistics of total rejections throughout the country. If you include the three months' losses and the secondary rejections after examination by civilian surgeons, the actual total is over 63 per cent. I think if Brigade-Surgeon Nash were here he would confirm me in this; then he disagrees with me in laying emphasis upon the necessity for selecting medical Officers as recruiters. I think if there is anything you ought to select a man for, it is recruiting; whether he be sergeant, or Field Officer, or Medical Officer, anybody, in fact, connected with it should be men of large views and large experience. A number of young Medical Officers have told me that they are often in a funk examining recruits, fearing they would be severely overhauled for making mistakes, and they look out for a medical cause of rejection first, if possible. In St. George's Barracks we fear nobody, because we know that if we are right we shall be supported. We do not primarily look out for medical objections, but first measure the recruit, and if he does not come up to standards reject him on that score. Our total rejections for "defective vision, under height, under weight, and under chest," for the four years from 1885-88 were therefore nearly 70 per cent., whereas throughout the army at large they were only 28, that is to say, we reject $2\frac{1}{2}$ times more for under-standard measurements than generally throughout the country; but our total rejections are only 4 per cent. more from all causes. I think I shall stick to what I have said, that you ought to employ your most experienced and best Officers in the recruiting service. About re-vaccination, he wants to know where I got the statistics. I worked them out myself, about ten years ago, for Sir William Muir, when the question was asked in the House of Commons. I found that up to 1874 I could get in the Blue Book the results of re-vaccination, and that 40 per cent. either were total failures or showed no indelible marks. I think, therefore, I am right in saying 40 per cent. of re-vaccinations are failures.

Brigade-Surgeon MYERS: That was prior to 1874.

Surgeon-General DON: Yes. I entirely agree with what Brigade-Surgeon Gribbon said as to town lads and country lads. As to the minimum chest measurement question, the Regulations distinctly lay down that the minimum is obtained after counting ten; there is no mistake about that. I have had a great deal to do with the Regulations, and I know the word "minimum" is employed in the exact sense stated by Dr. Gribbon, which is, that it is to be estimated after counting ten. I do not care a fig for a minimum so obtained, because I think it is of little value; it is more nearly a mean than a minimum; I can count twenty and fix my chest all the while. But if you say to a man, "Blow yourself out," and so take the maximum measurement, and then deducting the 2 inches or $2\frac{1}{2}$ inches you obtain the true minimum you want. It is well known that one of the first signs of phthisis—of consumption—is the want of expansion, the want of elasticity of the lung. I agree with everything that Sir Robert Biddulph said. There are very few General Officers more capable, from his great experience, of passing an opinion. I agree that a greater number of objections to recruits have come from those who have had the least experience in recruiting, especially from Commanding Officers who have spent much of their lives in India, and find themselves at home suddenly in a new state of things altogether. The fact is, objections as a rule are raised by the least experienced Medical and Commanding Officers. General Biddulph attaches great importance to weight. I attach very great importance to it. I think all who have had any practical experience in passing recruits will attach more and more importance to weight. I do not mean weight from fat, because among recruits that very seldom enters into the question. However, weight for inches, weight for height, weight for chest, chest for weight, height for weight, must all be in proper correlation. A man with good weight of limbs, even if the chest is a little deficient, is likely to do well in the Service; but I have never yet known a man with bad limbs to work well. He cannot march and cannot ride; he cannot hold on the horse. I agree with much that Major Barrington Foote said with

regard to town and country recruits, and the necessity of training boys for the Army as for the Navy. Some of our best recruits are boys brought up in asylums and elsewhere; they turn out good soldiers. Then about the question of choice and necessity. I give simply my own impression in that matter. I have no direct statistics to show whether recruits as a rule enlist more from choice than necessity; but the great majority put choice first. Of course there are a large number who want a "square meal," but they are not the best recruits. I prefer the fellow who comes of his own free choice. As I said when I began, I purposely abstained from going into the economic and political aspects of recruiting, because it is not quite in my line. It has been discussed here, we know, several times over, therefore I spoke of what I thought I had some right to speak about, that is, my own part of recruiting duty. I thank you again, my Lord and gentlemen, for the kind way in which you have received my paper.

LORD WOLSELEY: I think, gentlemen, we have all listened with very great pleasure and interest to the remarks that have been made upon the lecture as well as the lecture itself. As Dr. Don tells us, the lecture was essentially one upon recruiting business and the business of the Recruiting Department. Designedly, he did not, therefore, touch upon those points which have been referred to by several of the speakers as to the inducements that ought to be held out for men to enlist in the Army. But I should be very sorry if those whose opinions upon our system of recruiting might be formed by what they have heard here to-day, should go away with the idea to be gathered from what has been stated by one or two speakers, that the great bulk, the large proportion, of men who join the Army at the present moment join because they are in a state of starvation or want. I deny that most emphatically. I have no positive statistics to give you on the subject, but I see a great deal of the recruits of the Army when I go from time to time to various stations. From what I then see of our recruits I consider them to be a healthy, good-looking lot of men, and infinitely superior in every way, morally and physically, to the recruits of ten years ago, and, above all things, of twenty and thirty years ago. I attribute the improvement to two causes: First, because I believe the Army has become a far more popular institution than it ever was before. Men are now proud of being soldiers, and the great superstition that existed in former days against men enlisting in different parts of England is fast disappearing. I attribute it also to the fact that much greater care is bestowed upon recruiting than used to be done when I entered the Army. At all recruiting stations in England, and if I may venture to draw a distinction I say particularly in London, there is a great earnestness brought to bear upon recruiting work, both by the Officers in charge, and still more especially by the Medical Officers who have to inspect and pass the men. I do not think it is at all necessary that I should allude in any way to the various topics which have been touched upon, such as the employment of soldiers after they have left the colours and the question of deferred pay. Those are large questions, which have, as Surgeon-General Don has said, been dealt with and touched upon by many who have spoken in this theatre upon previous occasions. But I would merely say that, in common, I am sure, with every old Officer who is present here, I for one would hail with great pleasure indeed any arrangement by which a larger proportion of the public offices in this country were reserved exclusively for soldiers. And, what is more, I believe if there was an earnest wish, an earnest desire on the part of the public of England, and on the part of the Parliament of England especially, that it should be done, it could be done with the greatest possible ease. I believe if instead of all this talk which has taken place for many years back upon this subject, any man in high position who had the power to do it, was given a *carte blanche*, it could be done with the greatest possible facility and advantage, but till we have some one central department, some one central office to which all men requiring employés for the various branches in the public service had to apply, to obtain men,—till that has been established, I do not believe we shall ever obtain what we want in that respect. I am very often told by men in public offices when I ask them why they do not obtain the services of soldiers for vacancies, that they would have been very glad to have taken them, but there was no soldier who came forward. Until an Order in Council has been passed absolutely forbidding any man in a public position to give

away a position of trust, or of any position whatever that is paid by the State, to any man till he has applied to some central office and asked that central office, "Can you supply for the vacant position a discharged soldier or a man belonging to the Army Reserve?"—until that has been done I do not believe we shall ever arrive at what we have all set our hearts upon. As regards recruiting, I have already expressed the opinion I entertain upon the great improvement which has been brought about in the character of the recruits we now receive, but I am well aware that there are a certain number of Commanding Officers in the Army, and still more especially those Commanding Officers who, as General Biddulph has referred to, are in India, and have had very little experience in recruiting, and only see the soldier after he is a manufactured article, that really expect we shall send them not only good men but giants. The amount of giants in this country is limited; they are not very often the very best soldiers, but at any rate they are very difficult to obtain. I remember not many years ago a friend of mine asking a recruiting sergeant how it was he did not get a sufficient number of men of sufficient size for the regiment recruiting at that spot. The sergeant's answer was, "God Almighty does not make the sort of men you want." There was much truth in that reply. You can get a certain number of tall men with great chest development, but if you insist upon having an army of giants, such as Frederick the Great had, ~~and~~ and as we are popularly supposed to have had at some mythical period of our military history—men like our Life Guards and Foot Guards—you will end by having no British Army at all. The men of the size and shape you want do not exist in this country in sufficient numbers. I am glad, however, to say, that owing to the physical standard we have fixed for our recruits, we have got a very satisfactory and effective body of soldiers. There has been a good deal said in condemnation of the unfortunate town recruit. Well, I can only say, that in the regiment I belonged to we invariably preferred London men. We always enlisted in London whenever we could. It was a regiment of light infantry, and when we wanted smart men we always preferred London recruits. We were nominally a Scotch regiment, and for the sake of appearance we used to enlist about one-fourth of the men in the country parts of Scotland. We generally found the rustic from the fields a stupid fellow when compared with the town-bred lad. When it was a question of intelligent work to be done, the sharp little Londoner was superior to the country bumpkins whom we received from the plough.

General Sir BEAUCHAMP WALKER, K.C.B.: I entirely agree as to the cavalry. We infinitely prefer town recruits to country recruits; they can be drilled much more quickly.

Major-General DUNNE: The Rifle Brigade are entirely London men.

Lord WOLSELEY: I am glad to hear so many corroborations of my views on this point. It merely remains for me now to convey your thanks to the lecturer for the very admirable and interesting lecture he has given us.

Frederick William I the Father of Fred^{the} the Great.

Friday, June 14, 1889.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

FORAGE FOR MILITARY PURPOSES.

LECTURE II.

By GEORGE FLEMING, C.B., LL.D., F.R.C.V.S., Principal Veterinary Surgeon of the Army.

In the last lecture which I had the honour and the privilege of delivering before you on "Forage for Military Purposes," I dealt more especially with the different kinds of forage in use in the various armies abroad, the concentrated foods which have been proposed or used from time to time, and the forage which, after all, has been found best adapted for active service, *i.e.*, that which has been compressed. I dwelt strongly on the necessity for the forage used in the field being that to which the horses have been accustomed, and pointed out the inconvenience, oftentimes danger, in suddenly changing from one kind to another, particularly when horses are undergoing severe exertion, and are exposed to the weather. I showed that concentrated, or specially prepared, and what might be termed "artificial food," was not suitable for horses during war, and that quantity as well as quality was necessary in order to meet physiological demands. Much experimental investigation, no less than every day's practical experience, has demonstrated that concentrations and essences, though useful in the hospital stables, are of little value in sustaining the energies of healthy, hard-working horses; and that bulk is an important factor in allaying the pangs of hunger, and producing that contentment and satisfaction which leads to good digestion, and restoration to the system of that which has been expended in exertion.

The natural food of the horse, in Western countries at least, and which is oats and hay, appears to be sufficiently concentrated; and as it forms the staple aliment all the year round, it is that which should, whenever possible, be allowed on active service. The only preparation it needs—always premising, of course, that the quality is good—is that which best adapts it for conveyance, keeping, and ready issue, without waste either in transport or during consumption. And I ventured to insist upon this preparation being limited to crushing the grain, so as to render it easier of mastication (a great benefit to a

tired horse), and more readily and completely digested (a *desideratum* when the organism is fatigued, and assimilation is consequently weakened); while its being firmly compressed into cakes of a certain weight renders its transport an easy and economical matter, its preservation for long periods, even when exposed to the weather, certain, and its distribution very simple.

The same was said with regard to the hay, which, next to the grain, is so necessary as an article of food. In the field, long hay, even when compressed into compact trusses, is troublesome, and not economical. It is easily damaged by the weather, there is much waste in distribution, and still more in feeding it to the horses when they are on picket lines, and especially when the weather is wet or windy; as then it is either trodden into the mud or blown away. In order to economize space in transport, render it capable of being kept for an indefinite period, readily issued, and easily consumed by the horses without waste, I remarked that it might be "chopped" or cut into short pieces, firmly compressed into cakes of a given weight, and—as with the grain cakes—a certain number of these packed into bales. The grain and hay could be given to the horses, mixed, in a convenient-sized nosebag, and thus all waste would be avoided; while mastication being made so much easier and quicker, the horses would have more time for rest.

Other advantages attending the provision of this kind of portable forage I alluded to, and among them I included that of a smaller quantity of this food being equivalent to the ration of ordinary forage, *i.e.*, uncrushed grain eaten out of the present pattern of nosebag, and long hay eaten off the ground. The diminution might be fixed at a pound, or at least half a pound, per ration. But this matter of ration leads to the consideration of the lecture of to-day, which is intended to deal with the allowance of forage necessary to maintain troop horses in a fit state of health and vigour, so as to meet the requirements of service, either in garrison or the field. On active service, more especially, is this an important matter, as it is absolutely necessary that horses should be kept in the highest state of efficiency, and ready for the severest and most prolonged trials, or the most sudden emergencies; while, at the same time, there may be grave difficulties to be contended with in procuring an adequate supply of forage for this purpose.

The question as to what amount of forage should constitute a suitable ration for military horses is not so easily dealt with as might be imagined, for in discussing it several circumstances have to be taken into account—such as the size of the horses; the season of the year and the climate; the work the horses have to undergo; whether they are protected from, or exposed to the weather; whether they are accustomed to privations, or have been regularly and well fed, &c.

Of course, a certain amount of food must be allowed horses to maintain them in health, even when they do not perform any work; but beyond this allowance there must be an increase in proportion to the energy expended in exertion, though this can only be up to a certain point; for if this expenditure becomes greater than the

system can sustain, then an unlimited quantity of food, even though it be of the most nutritious kind, will not enable them to withstand the strain upon the vital functions.

It might, therefore, be laid down as an axiom, and, indeed, it is generally so recognized, that the quantity of food beyond a certain allowance for what has been well termed "internal" work, and which should be proportionate to the size of the animals, should be sufficient to meet the demands of "external" work and the special circumstances in which troop horses may be placed. In our army, there is a uniformity in this matter which reduces the question of feeding to the greatest simplicity, though it must be confessed that it is scarcely in harmony with reason or experience. The forage ration is never varied all the year round, no matter how young or how old the animals are, how heavy or how light the work may be (with one or two exceptions to be presently mentioned); and large horses weighing 1,200 or 1,400 lbs. receive the same quantity as those weighing 800 lbs. This ration is, as you are aware:—

If in quarters, oats 10 lbs., hay 12 lbs., straw 8 lbs.

If in encampments, oats 12 lbs., hay 12 lbs.

If employed on draught work, 2 lbs. oats extra.

The extra issue is allowed to horses of the Army Service Corps drawing wagons at a trot; and during the winter months only, for all other draught horses when employed on continuous draught work for a period of at least five hours a day.

An extra issue of 2 lbs. of oats, in addition to the ordinary ration in quarters or in encampments, is allowed to draught horses of the Army Service Corps when these are 16 hands high and upwards.

In Continental Armies, the allowance of forage is systematically adjusted to the size of all the horses and the nature of their work.

In the German Army, for instance, there are four scales of forage rations, the difference between them consisting chiefly in the amount of oats. There is, first, the heavy ration, which consists of 11 lbs. $7\frac{3}{4}$ ozs. of oats; second, the ration for Light Cavalry of the Guard, which is 10 lbs. 15 ozs.; third, the medium ration, which is 10 lbs. $11\frac{1}{2}$ ozs.; and fourth, the light ration, which is only 9 lbs. $13\frac{1}{2}$ ozs.

The allowance of hay is 5 lbs. $7\frac{1}{2}$ oz., and of straw 7 lbs. $10\frac{1}{2}$ ozs.

These rations are issued as follows:—

The heavy ration is allowed to horses of General Officers, the General Staff, Adjutants, Officers of the War Ministry, Cuirassier and Guard Lancer Regiments, Military Riding School, Guard Horse Artillery and Field Officers of Guard Field Artillery, all Artillery draught horses, those of the Gendarmerie and Intendance, and Transport draught horses. Troop horses of the Gardes du Corps Regiment receive at all times 1 lb. $1\frac{1}{2}$ ozs. of oats, and 3 lbs. $4\frac{1}{2}$ ozs. of hay extra.

The second scale is given to the Light Cavalry of the Guard, Guard Dragoons, and Guard Hussars.

The medium ration is for the lancer regiments of the line.

The light ration is for all other troops and the horses of Officers not specified.

The above are termed the "Garrison Rations," and are only drawn for horses on the strength; the three or four extra horses in each squadron, battery, and company of Transport have to be fed on what can be saved from the forage of the others. It is not compulsory to give the horses their full rations daily, but a portion may be reserved for times when work is heavier than usual.

On the line of march the ration is increased as follows:—

Heavy ration to 13 lbs. $3\frac{3}{4}$ ozs. oats.

Light Guard Cavalry ration to 11 lbs. $7\frac{3}{4}$ ozs. oats.

Medium ration to 11 lbs. $4\frac{1}{4}$ ozs. oats.

Light ration to 10 lbs. $6\frac{1}{4}$ ozs. oats.

The heavy ration of oats is accompanied by 3 lbs. $4\frac{9}{16}$ ozs. each of hay and straw for feeding; the other rations having 3 lbs. 4 ozs. of hay, and 3 lbs. $13\frac{1}{4}$ ozs. of straw for the same purposes, as litter is provided in the billets.

In the field this ration is increased all round by $8\frac{3}{4}$ ozs. of oats, each horse then carrying what is called "the iron ration of oats"—nearly 14 lbs. the heavy ration, over 12 lbs. the second, 11 lbs. 13 ozs. the third, and 11 lbs. 1 oz. the light ration.

During railway transport, each horse is allowed 3 lbs. $4\frac{1}{2}$ ozs. of hay, and 2 lbs. 3 ozs. of straw to lay on the floor and ramp of the wagon. If the journey lasts longer than eight hours, 6 lbs. 9 ozs. of hay is allowed extra for every twenty-four hours.

During Army Corps manœuvres and Cavalry Division exercises for a period of four weeks, the following rations are allowed:—

For Cuirassiers or Horse Artillery draught horses, 12 lbs. $14\frac{1}{2}$ ozs. oats.

For other line cavalry regiments and horse artillery riding horses, 11 lbs. $7\frac{3}{4}$ ozs. oats.

As on the march, 3 lbs. 4 ozs. of hay and 3 lbs. $13\frac{1}{4}$ ozs. of straw are allowed.

Three-year-old remounts at the Remount Depôts receive:—

Oats, 6 lbs. 9 ozs.

Hay, 10 lbs. 15 ozs.

Straw, 13 lbs. 2 ozs.

For three or four months of the year they are put on green food, but the transition to and from this is gradual.

In the French Army there is a similar gradation in the scale of forage ration, according to the arm of the Service and the kind of work performed. The light cavalry (infantry Officers' horses are included in this category) allowance per horse per diem is—oats about $8\frac{3}{4}$ lbs., hay $8\frac{3}{4}$ lbs., straw $5\frac{3}{4}$ lbs. in garrison; on the march it is 10 lbs. oats, with the same quantity of hay and straw as in garrison; at manœuvres, if the horses are in barracks they receive the same ration of oats as in garrison, with $6\frac{3}{4}$ lbs. hay and about 9 lbs. straw, but if in bivouac then the ration is the same as for the march; while

on a war footing it is $10\frac{3}{4}$ lbs. oats, $6\frac{3}{4}$ lbs. hay, and $4\frac{3}{4}$ lbs. straw. The line cavalry (the horses of engineer and infantry Officers are on this scale) receive in garrison 10 lbs. oats, $6\frac{3}{4}$ lbs. of hay, and 9 lbs. straw; on the march $11\frac{3}{4}$ lbs. oats, and 11 lbs. hay and straw; at manœuvres, if in barracks the ration is the same as in garrison, if in bivouac it is as on the line of march; while on a war footing it is nearly 11 lbs. oats, 9 lbs. hay, and $4\frac{1}{2}$ lbs. straw. The reserve cavalry includes the horses of the Staff, Intendance, Staff of Artillery, and of Engineers, and Auxiliary Transport. The ration in garrison is—oats $11\frac{1}{4}$ lbs., hay 9 lbs., straw 9 lbs.; on the march it is—oats 12 lbs., hay and straw 11 lbs.; on manœuvres, if in barracks it is the same as in garrison, and if in bivouac the same as on the march; on a war footing the allowance of oats is 13 lbs., hay 9 lbs., straw $4\frac{1}{4}$ lbs. For artillery horses—draught and saddle—the garrison ration is $10\frac{3}{4}$ lbs. oats, hay 9 lbs., straw 9 lbs.; on the march it is 12 lbs. oats, 11 lbs. hay, and the same of straw; on manœuvres, if in barracks it is the same as in garrison, if in bivouac, the marching allowance is given; the war ration is nearly 13 lbs. oats, 9 lbs. hay, $4\frac{1}{2}$ lbs. straw.

In the Russian Army the daily ration during peace is as follows:—

Guard Cavalry and Artillery, 12 lbs. $7\frac{3}{10}$ ozs. oats, 9 lbs. 1 oz. hay, 3 lbs. 10 ozs. straw.

Line cavalry, artillery, and engineers, 9 lbs. $5\frac{1}{2}$ ozs. oats, and the same hay and straw as above.

Transport draught horses, 7 lbs. $12\frac{1}{2}\frac{1}{10}$ ozs. oats, 18 lbs. 2 ozs. hay.¹

In the regiments and batteries of the Guard, this allowance is given all the year round, but in other corps it is only issued for eleven months, the horses being turned out to grass, and receive no more than 13 lbs. $9\frac{1}{2}$ ozs. of hay for one month after the manœuvres.

If necessary, barley may be substituted for oats, weight for weight, and hay can replace oats in the proportion of 4 lbs. $8\frac{1}{2}$ ozs. of hay for 3 lbs. $1\frac{4}{5}$ ozs. oats. In war, the above rations are issued, with the addition of 3 lbs. 10 ozs. of oats; and in lieu of straw 4 lbs. $8\frac{1}{2}$ ozs. of hay are given. Thus, the forage ration of a line cavalry regiment during war is 12 lbs. $15\frac{1}{2}$ ozs. of oats, and 13 lbs. $9\frac{1}{2}$ ozs. of hay.

From this statement, you will see that in the great armies of the Continent, close attention has been paid to the quantity of forage required in each arm of the Service, to ensure physical fitness in peace and in war; and you will also gather that in our Army this subject has evidently not received the notice it deserves. Our horses are either underfed while they are performing hard work, or they are overfed when this is light; and if the ration is sufficient for large horses, it must be more than sufficient for small ones. I am certainly of opinion that the whole subject of forage for our troop horses needs investigation; and in view of the fact that the allowance is not

¹ Since this lecture was delivered, Major J. Wolfe Murray, Intelligence Branch, War Office, has had the goodness to inform me that the ration of forage for the Train horses of the Russian Army has been considerably modified, as he had already pointed out in this Journal for 1886, p. 1033. Instead of the daily ration being as above, it is now $13\frac{3}{4}$ lbs. oats and $13\frac{1}{2}$ lbs. hay—a greatly improved ration certainly.

properly apportioned between light and heavy horses, or with reference to the work done, and that it is generally inferior to that of other European armies, especially that of Germany, I think the time has arrived when this inquiry should be made. In this inquiry the quality of the forage should not be overlooked; the present contract weight of oats is too low, and should be altered. No oats for army horses should be less than 40 lbs. per bushel.

We must recognize the fact that to feed horses well may be expensive, but to feed them badly, even in peace-time, is much more so; while to nourish them insufficiently during war may mean heavy loss or disaster.

It is not always easy to combine economy, or rather cheapness, with efficiency of a permanent kind. With armies which must always be prepared for war at short notice, and must be rapidly mobilized, the mounted corps should require little, if any preparation, so far as their horses are concerned; for unless they are kept always in a fit state for the field by good feeding and training, there may not be time to prepare them—and some time is needed to do this—when the urgent moment arrives. This necessity must be recognized as applying more especially to the cavalry, as it has to encounter the first strain in warfare; and the army which has its horses in the fittest state will, probably, be that which will gain successes at first, and early victories often decide campaigns.

I would not have it inferred that horses should be rationed to the same extent when performing light work—as is often the case at out-quarters in winter—as during the summer manœuvres; they should be fed to a degree equal to the labour exacted from them. If a horse is not fed in proportion to the work imposed upon him, compensation has to be made from his muscles; so that he partially consumes them, and consequently loses weight. If a sufficiency of food is not supplied in time, with this loss of weight there is diminution of energy as the muscular tissue disappears, and at last exhaustion ensues.

On the contrary, if the allowance of food is greater than is required, some of it will not be consumed, and a portion will be expended in laying on useless fat—while the state of plethora so engendered will be accompanied by a tendency to disease, and an excitability and restlessness which will lead to a large increase in the list of casualties.

The weight of horses is, to some extent, a *criterion* by which a conclusion may be arrived at as to whether they are sufficiently fed. Loss of weight accompanies an insufficient supply of food, and this loss is all the more marked and rapid as the deficiency is great and prolonged; it is all the greater if the food at the same time be of inferior quality.

We are all familiar with the change wrought in the appearance of horses which have undergone the fatigues of a severe drill season, without any increase in their forage ration; and if their weight were to be compared with that which it was before the season commenced, there would be found a considerable diminution. I do not know if this has ever been accurately tested in our Army, but it appears that

it has been ascertained on, at least, one occasion in one of the Continental armies—that of Austria. In a military journal of that country (*Oesterreich-Ungarische Wehr-Zeitung*), published in October, 1887, there is a report upon the condition of artillery horses belonging to a Division, during the annual manoeuvres. The artillery Commandant had the horses weighed before they marched on August 20th, and again on their return to quarters on September 7th—a period of eighteen days. Before marching, the average weight of the horses was:—

In the first battery	974 lbs.
In the second battery	967 lbs.

On their return, the average weight was:—

In the first battery	945 lbs.
In the second battery	943 lbs.

The average loss of weight was therefore 29 lbs. and 24 lbs. The work performed during the eighteen days was on an average from 18 to 22 miles *per diem*.

But we must not forget that the weight test is not altogether a reliable one, unless we take into our consideration, at the same time, the condition of the horses—that is, their energy and endurance. Horses idle and fat, and therefore not well-fitted for hard work, will weigh heavier than the same horses in good hard condition, and capable of undergoing severe toil. A race-horse, in training, loses weight, but gains in vigour.

I do not consider our cavalry horses, in peace-time, badly fed, nor yet overfed; though it would be an advantage if the ration could be so amended as to allow of more grain being given during the hard work period, and less during the easy work period. For the heavy horses of artillery, Royal Engineers, and Army Service Corps, the allowance certainly appears insufficient, if size and weight are to be estimated in alimantation. And in these this insufficiency is more noticeable than in cavalry during heavy marches in the drill season. It should be the aim of those who have to arrange for the feeding of horses, and more especially during active service, that the ration should be such as to maintain undiminished weight, and increased energy, if possible, under all circumstances. No economy can be more pernicious than underfeeding either soldiers or horses on a campaign. The better they are fed, the better they will perform.

As I have already stated, a certain amount of good food is necessary to keep horses in health and condition, and if work is heavier than usual, or they are exposed to bad weather, or have to undergo severe hardships, then additional forage should be given, and in proportion to the increase in waste of the body through these exactions.

Horses for war should always be in a fit condition for the field, and therefore there ought not to be much variation in the forage ration during peace, except an increase to a small extent when the drills are heavy, and a decrease when the work is light. What the peace ration should be is shown in that laid down for each of the principal European armies. For our own Army, I have pointed out that size,

work, and season are scarcely taken into consideration in fixing the ration. I think it would be advantageous to modify it to meet the requirements of these. If 10 lbs. of oats and 12 lbs. of hay are only sufficient for horses when in barracks at out-quarters, surely this allowance is insufficient when on the line of march or during the drill season!

Compared with the horses of civilians, it cannot be said that, when undergoing a like amount of work, army horses receive too much food. For the largest-sized draught horses which perform steady hard work for a number of hours during five or six days in the week, the daily allowance of food for each horse is about 18 lbs. hay and a small proportion of straw, cut into chaff, with 18 lbs. of oats, and a pound or two of peas or beans. The usual weight of dry food absolutely consumed by an average-sized, well-conditioned cart-horse moderately worked, regularly fed, well stabled, is from 29 lbs. to 34 lbs. daily, of which the hay and straw should constitute about two-fifths; and it is generally recognized that, no matter how nutritious it may be, less than 29 lbs. will not suffice to maintain the body in a fit state for work. In a stud of cart-horses in Liverpool, the following was the daily allowance:—Maize, 10 lbs.; Egyptian beans or Canadian peas, 5 lbs.; oats, 2 lbs.; oatmeal and linseed, 1·3 lbs.; bran, 2·1 lbs.; hay, 10·6 lbs.; roots and grass, 3 lbs. The maize, and beans or peas, with the bran and chopped hay, formed the basis of the usual food allowance. The oats and linseed were only used for sick or delicate-feeding horses. The oatmeal was made into gruel, of which each horse was allowed a drink on returning to his stable when the day's work was done. The roots and grass were given during the months it was considered advisable to use them. In autumn and winter the grain was crushed and given uncooked, except a night feed of steamed food two or three times a week. In spring and summer the grain was steamed, but an occasional meal of dry food was allowed as a change. A further change, both in the quantity and proportion of the grain given, was also frequently made, as conditions of weather or work appeared to require, but the autumn allowance was always considered the most invigorating. The bulk of the hay was given in the form of chop or chaff with the grain, 2 or 3 lbs. of long hay being reserved for night consumption. The best clover hay was always used; and a small quantity of straw was sometimes chopped with the hay. The horses were of average size, moderately worked for six days, and one-fourth of their number for about three hours on the seventh day; their condition was good.

A company employing a large number of horses which draw heavily laden carriages, allows the following ration for each horse per diem:—Hay, 16 lbs.; oats, 10 lbs.; beans, 5 lbs.; maize, 4 lbs.; bran, 2 lbs.; total, 37 lbs. of food for every day. The hay is all chopped, and the grain crushed separately, then both are mixed before being given to the horses.

Every Saturday night each horse is allowed a mash of linseed, mixed with a small proportion of bran, boiled altogether, and given warm. When the work is less, then less grain is given. This, I

believe, is about the usual quantity of food allowed for the larger, slow-paced, and steadily worked horses of civilians. For those of smaller size, but performing work at a faster pace—such as omnibus or tram-car horses—a smaller allowance of food is generally given. The following was the daily ration of the principal tramway companies in the United Kingdom not long ago. It may be observed, however, that this allowance varies in the proportions, according to the price of forage in the market, and also sometimes according to the season:—

North Metropolitan.

	lbs.
Maize	13
Oats	3
Beans	1
Peas	1
Hay, chopped	7
Straw „	3
Total.....	28

London.

	lbs.
Maize	7
Oats	3
Peas	3
Hay, chopped	12
Straw „	1
Total.....	26

London Street.

	lbs.
Maize	12
Oats	3
Beans	1
Bran.....	1
Hay	11
Total.....	28

South London.

	lbs.
Maize	7
Oats	7
Beans	1
Hay, chopped	11
Straw „	3
Total.....	29

Birmingham.

	lbs.
Maize	6
Oats	10
Beans	4
Chaff.....	12
Total.....	32

Liverpool.

	lbs.
Maize	12
Beans	4
Chopped hay	14
Bran.....	1
Total.....	31

Manchester.

	lbs.
Beans }	15
Oats }	
Maize }	15
Hay }	
Total.....	30

Glasgow.

	lbs.
Oats	6
Maize	11
Hay.....	8½
Straw.....	1
Bran	0½
Total.....	27

<i>Edinburgh.</i>		<i>Dublin.</i>	
	lbs.		lbs.
Oats	8	Maize	14
Maize	4	Oats	3
Beans	4	Hay.....	12
Hay	14	Bran	0 $\frac{1}{2}$
Marshlam.....	2		
	—		
Total.....	32	Total	29 $\frac{1}{2}$

The work of these horses is performed at a trot of about 7 or 8 miles an hour, with very frequent stopping and starting, and the average distance travelled is probably about 13 or 14 miles a day. Omnibus horses receive a similar ration, but the work is not so heavy.

In the pre-railway days, the horses which drew the mail and stage coaches were most liberally fed, and this liberality was well rewarded by the manner in which their work was done and the appearance they presented. "Nimrod" (Mr. Apperley), in his work on "The Chase, the Turf, and the Road" (published in 1837), alluding to these horses, says: "No horse lives so high as a coach-horse. In the language of the stable, his stomach is the measure of his corn; he is fed *ad libitum*. The effect of this is visible in two ways: first, it is surprising to see how soon horses gather flesh in this severe work, for there is none, so far as muscular exertion goes, more severe while it lasts; and, secondly, proprietors find that good flesh is no obstacle to their speed, but, on the contrary, operates to their advantage."

It is scarcely possible to compare draught Army horses with those employed in this way in civil life, with respect to the amount of work they have to undergo, and especially when the former are in the field. The demands of active service are generally of the most exacting and harassing kind. Much of the traction may have to be done where there are no roads, and often in heavy ground; while with some corps—as the horse artillery, and even the field artillery—the pace may require to be fast, and over very difficult country. At the same time, the horses generally have to remain without shelter and exposed to the weather, and receive but little attention, so far as grooming is concerned. Civilians' horses labour under none of these disadvantages in performing their service. They work on well-made roads, have a definite amount of regular toil every day, are comfortably housed, cleaned, and regularly watered and fed by men who are themselves comfortable and exempt from danger, hunger, and exposure.

Army horses, therefore, employed in draught should be at least as well fed as those of civilians, more especially when the former are on active service. The grain ration should be high, as liberal, in fact, as that of the coach horses mentioned by "Nimrod." 16 or 18 lbs. a-day per horse would not be too much, particularly in long and rapid marches, and even more should be given if the weather is at the same time unfavourable. If the grain is crushed, so much the better; indeed, for tired horses especially, all grain should be so prepared. The

amount of hay in the field is a secondary consideration; as the grain is increased in quantity, the allowance of hay should be diminished.

With regard to cavalry horses the same remarks apply. The work of such horses is, in many respects, like that of hunters, though it is performed in very different circumstances, and under disadvantages such as hunters never experience. Carrying far heavier loads at all paces, cavalry horses may be required to exercise their energies for days together in bad as in good weather, and without being comfortably stabled or cared for after the day's toil is over: the food being often scanty, and of bad quality at the same time. The hunters, on the contrary, rarely have more than two days a week in the field, and they are seldom overweighted then. They are not troubled with dead hamper on their backs in the form of kit and equipment, as troop horses are, nor, like them, have they to carry from 18 to 20 stone, unless specially selected by their size and strength to move easily with such a load. Troop horses cost 40*l.* a-head to buy; hunters, to carry the weight they support, would fetch several hundreds of pounds each. The allowance of forage for a hunter of this size is probably not less than 16 lbs. of the best oats daily, to which probably 1 or 2 lbs. of beans and some carrots will be added, while 8 or 10 lbs. of excellent hay supplements the grain. Kept in warm stable, clothed, bandaged, and groomed in a manner to which the trooper is an utter stranger, and with only two days' work in seven, at the end of the hunting season such horses, nevertheless, often show marked signs of fatigue and wear.

Need we wonder, then, that cavalry horses on a campaign should soon begin to break down, when taxed as hunters never are? One chief cause for breaking down is insufficient food, and, therefore, though serious obstacles may arise to hinder ample supplies of forage being obtained, everything possible should be done to keep the horses well fed. Cavalry must act with celerity and energy, in order to favourably influence the success of a campaign; and unless the horses are well attended to in the matter of forage, their action must be weak and slow, and losses among them will be heavy.

These remarks apply more particularly to the horses bred in this country, to which a plentiful supply of good forage is absolutely necessary. Whether it is because they are not inured to hardship, to which they are indeed rarely exposed at home, and seldom miss a meal, much less lose a day's ration, or that they are constitutionally delicate, and suffer to an extraordinary degree when their ordinary allowance of food is diminished, certain it is that, unless they receive particular attention in the matter of aliment on active service, they quickly give in. In this respect they differ much from the horses of other countries, and especially those bred in the East. More powerful and fleet than they when well supplied with pabulum, they offer less resistance to the effects of short rations, and become of little use when receiving an allowance upon which other races can undergo severe fatigue. It is true that our horses are never tested by experience of the hardships of war in their own climate, nor usually in a climate resembling their own; and this may afford a reason for their

being easily rendered inefficient when sent on active service out of this country, as climate at first affects horses more seriously than it does men. The fact remains, that unless very well fed and cared for, our horses, light and heavy, have a great tendency to become feeble—to lose heart on service; our recent campaigns in South Africa and in Egypt and the Soudan afford ample confirmation of this, while our experience with other races shows that they are not so susceptible.

Take, for instance, the small horses generally designated Arabs. It is wonderful the power of endurance they display when carrying heavy loads for long periods, and receiving at the same time a very scanty allowance of food. One of the most notable instances of this natural hardihood was afforded by the 19th Hussars in the Soudan, in 1884–85, and deserves mention here, as it is not only pertinent to the subject under discussion, but reflects great credit upon that excellent regiment, and especially upon its then chief—the lamented Colonel Barrow—surely one of the most promising and accomplished cavalry Officers our Army has produced.

The regiment was mounted on Syrian horses, whose average height was about 14 hands, and average age 8 to 9 years old, though about 15 per cent. were more than 12 years old. Some 50 per cent. had been through the campaign in the Eastern Soudan with the regiment in the early part of 1884, and returned in a very exhausted condition; and about 10 per cent. had been at Tel-el-Kebir. In June, 1884, they were taken to Assouan from Cairo in barges, and remained there three months. In September they were marched to Wady Halfa, a distance of 210 miles, and there 350 were, in November, handed over to the regiment; all except some 10 per cent. being in fair marching condition. The regiment marched from Wady Halfa to Korti, about 360 miles, the average daily march being about 16 miles, not including halts, which were for four days.

The ration was supposed to be 8 lbs. of grain—barley or dhourra, and 6 lbs. of dhourra stalk; but owing to scarcity, the horses generally received about 6 lbs. of grain and 10 lbs. of stalk. They arrived at Korti in good condition, remaining there for about a fortnight, and receiving about 8 lbs. of green dhourra stalk daily, instead of dry stalk, upon which they improved. At the end of December, 40 horses proceeded to Gakdul, 100 miles, and performed the reconnaissance duties of the column. The march was accomplished in 63 hours; 15 hours' rest was allowed, and then the return march was completed in the same time as the outward one, except that 6 horses did the journey in 46 hours, the last 50 miles occupying $7\frac{1}{2}$ hours. During the 141 hours of the march, the horses were ridden for 83 hours. On January 8th the 155 horses, and 127 men, with 8 Officers, crossed the desert with General Sir Herbert Stewart's column; there being an extra horse for each Officer, and 12 spare horses for the men. The average forage ration for the first 10 days was from 5 to 6 lbs. of grain, with 2 gallons of water; 31 miles were marched daily, not including one day's halt. When the first advance was made to Matammeh, the horses marched to the Nile without having received a drop of water for 55 hours, and only 1 lb. of grain. Some 15 or

20 horses received no water for 70 hours. Between January 20th and February 14th the horses received no grain, but received about 10 lbs. of dhourra stalk daily, or 12 lbs. of green dhourra or green beanstalk. Two days before marching they had 6 lbs. of grain each. They performed outpost and patrol duty, averaging about 8 miles daily, and under these conditions they recovered from the effects of the desert march, though many were in a weak state. For the first 75 miles, the horses had only 4 lbs. of grain and 3 gallons of water; for the remainder of the journey water was plentiful, and 8 lbs. of grain could be spared for each horse. Two marches of more than 40 miles each were made—evidence that the horses were still in a fit state. After two weeks' rest at Korti, the horses marched strong and well to Dongola and other stations, receiving plenty of food and water, and after two months' halt they were in quite as good condition as when they left Wady Halfa. The return march to the latter place—about 250 miles, was performed at the average rate of about 16 miles a day, with one halt for two days.

During this nine months of a hard campaign, in which more than 1,500 miles were marched, only twelve horses perished from disease, though from other casualties fifty-nine were lost. The weight carried by each of these ponies never averaged less than 14 stone, and during the last four months of the campaign the weather was very trying, and the scarcity of water was often severely felt. The management appears to have been excellent; the horses were spared as much as possible from unnecessary fatigue, the men never being allowed to remain in the saddle a moment longer than was needed; marches in column were avoided, extended line being adopted, and when picketed the horses had always plenty of room, and their heads to the breeze. They were allowed to graze, on every possible occasion, on the grass of the Bayuda Desert, though it was too dry to be swallowed.

I think it is pretty certain that English horses would not have survived such an ordeal as this.

In India somewhat similar incidents have been recorded, cavalry horses having successfully undergone long and severe marches on small rations; and Darwin, in his "Voyage of a Naturalist Round the World," mentions the great endurance of South American horses, particularly describing a journey he made, in which his horses had no food for five days.

Whether our horses could be trained to undergo such fatigue and fasting is a question which cannot be answered offhand; but it would be well not to depend upon their displaying much fortitude in the matter of short rations in the field, but rather to make provision for their wants being supplied in no stinted manner. If their powers of endurance are not so developed as in some other races, yet they far excel these in other important respects; like their masters, they possess exceptional qualities which are most conspicuous when food is plentiful, and, knowing this, our aim should be to provide it in sufficient quantity and of good quality—whether the horses are in quarters or the field. To succeed in doing this requires more than

ordinary care and attention on the part of those who are responsible for the efficiency of our mounted troops. Forage rations are as difficult to deal with, perhaps, as are the soldiers' rations—so far as quantity and quality are concerned.

Lieutenant-Colonel COLVILLE: As someone must make a start, with your permission I will make a few observations. The paper which has been read by Dr. Fleming is an extremely interesting one, but it is of a technical character, and, therefore, is probably interesting only to those who take more or less interest in horses. If you take the paper as a whole it consists in this, that horses used in civil life in the country and horses belonging to people not in the Army are fed according to the climate, according to the work they have to do, and according to the season of the year; but that in the Army this rule is not observed, and they are fed all the year round exactly in the same way. Whether the paper is intended to bring that particular feature prominently forward or not I do not know, but I should have thought that any man who was not blinded by innumerable rules of red tape would have acknowledged that that was common sense, and should be observed both in the Army and out of the Army. I should like, as a matter of information, to ask Dr. Fleming whether these Syrian ponies, to which he referred, were entire, or whether there were any mares, and if so, what proportion of mares there were? Dr. Fleming tells us that all horses in the Army, as they necessarily would be the first called upon for active service, should be kept well fed and in high condition, ready to take the field at a moment's notice. That, of course, is perfectly right as to foreign armies, where they have to move by land; but is not there this to consider, that in England before the active operations commence, the horses would probably have to travel some distance by sea, and if they were in too high a condition it would be more injurious to them than if they were in a lower condition, not so well fed, and softer? That is one of the great disadvantages that cavalry now have to undergo in the English Army—they have to travel by sea, and they lose their condition even if they have it, and if their condition is too high they are apt to die. I must confess to being a little disappointed at the lecture. I came in hopes of hearing some proposal from Dr. Fleming as to an improved method of obtaining the forage and of distributing it. I have always thought, and still think, that the system upon which our cavalry horses are fed is not either economical or judicious; that the forage should be purchased by the Army direct, without the intervention of any middleman; that there should be a store in a central position like Aldershot; that all ought to be chopped and mixed, and then should be distributed in bags, say of 90 lbs., sufficient for three horses or more—in the case of cavalry they do not get so much. The horses would then get all that they are supposed to get, and you would be certain that the quality of the hay and oats was really such as was paid for, in which case the taxpayer would benefit to the extent to which the contractors now unduly benefit.

Inspecting Veterinary Surgeon W. B. WALTERS: I should like to say a few words with reference to Dr. Fleming's interesting lecture. I can, perhaps, answer one of the questions asked by Colonel Colville, with reference to the purchasing of forage. For some time past forage has been purchased in Aldershot direct, by Officers of the Commissariat Department, and up to the present the system has answered admirably. With reference to horse feeding generally in the Army, I quite agree with the lecturer that it requires investigation and revision, because I am quite sure that the habit of feeding heavy horses with the same weight of grain and hay as light horses is wrong in principle. The heavy horses are generally the first to suffer in condition on a campaign, and, therefore, require more food in proportion to their bulk than the lighter ones. At the same time I think that if, say, three scales of forage were adopted—I, II, and III—I, for heavy cavalry and draught horses; II, for medium cavalry; III, for light cavalry, infantry, Officers' chargers, and so on—it would be quite sufficient, because I think the German system is very much too complicated. It is excellent in theory, but in practice it would hardly be found to be quite as perfect. Then also as to increasing the ration on the

line of march, mentioned as being adopted in the German Army, I do not quite see why horses should receive an addition to the ordinary scale of ration while actually on the line of march, because the result of this extra feeding—improved condition and increased powers of endurance—should be, I think, present at the time the horses are marching. The effect of giving extra food only during the period of increased exertion would be almost like giving a man a heavy meal just before he has to run a race. It is better to *prepare* horses for the line of march by commencing the extra rations some weeks before they are required to start. As regards the quality and weight of the oats supplied to Army horses, I certainly think that the grain should not weigh less than 40 lbs. the bushel, because in nearly all samples of foreign oats—and the grain purchased for the Army is principally of foreign growth—there is an admixture of seeds which are not only innutritious, but in many cases deleterious in their nature. I have always been an advocate for crushed oats. It has been observed by many Officers in the Army that the issue of crushed oats on a campaign would be a matter of difficulty if not an impossibility. I think, on the contrary, that there would not be the slightest trouble about it. Crushed oats are considerably more easily digested and assimilated than whole oats, and I am of opinion that 10 lbs. of grain in this form is equal in nutritive value to 11 or 12 lbs. of uncrushed oats. That form of forage known as “grain cake” is most excellent of its kind, and certainly is far easier of transport than the same weight of whole oats. With regard to the loss of condition of horses on service, my experience of campaigning has taught me that cavalry horses are generally the first to fall away, particularly those of heavy cavalry; therefore it is quite necessary that our cavalry horses should be kept up to the highest standard of condition at all times. Of course we know perfectly well that prior to embarking horses for a long sea voyage, it is very necessary to make an alteration in their diet, in fact to prepare them for a period of inactivity; but if animals are embarked in a high state of health and vigour, the loss of condition during the voyage will not be great, and will soon be recovered. With regard to the Egyptian horses mentioned by Dr. Fleming, I had some experience of this class of animal in the Soudan, and thoroughly agree with every word that he has said. They were principally stallions, and these hardy little animals certainly did their work wonderfully well without suffering from privation or climatic influences to anything like the extent experienced by the English horses, although often placed under less favourable conditions.

Colonel F. J. GRAVES, 20th Hussars: Colonel Colville expressed his regret that the lecturer had not made any proposition. Although there was no direct proposal made, I think it is evident that a useful proposition was made by inference, and I think it is very necessary that the whole question should be investigated with a view to the proper proportioning of forage to the horse's size, work, and to the season; and I am quite in agreement with such a proposal being carried out. It seems to me to be absolutely absurd that a horse at 15.2 carrying a hussar of my own regiment should be fed all the year round upon 10 lbs. of oats and 12 lbs. of hay in the same way as a horse of 16.2, and perhaps 300 lbs. heavier in total mass, carrying possibly from 21 to 22 stone; it seems ridiculous on the face of it. There is a very interesting comparison drawn in the lecture between two batches of artillery, both before and after eighteen days' hard work. In my own regiment at Norwich the other day, an experiment was carried out, not before and after hard work, but positively during a time of what one might call comparative idleness. We had some sixty odd horses, one squadron, put under experiment. I am sorry to say the instructions with reference to carrying out the experiment were so limited that I do not think the result of the experiment or the reports thereon will be helpful in any way, and for this reason: the instructions conveyed to us were simply to report as to the advisability, as I gathered, of a permanent reduction of 2 lbs. in the general ration of oats. This experiment was carried out in the furlough season when we probably had not enough men to groom the horses, let alone exercise them, and when there was very little or no drill done, for the simple reason that we are forbidden to go on the drill-field for fear of cutting it up; and under the further ridiculous condition that every day the horses did happen to go out on outpost duty on the roads, they were to have 2 lbs. of oats extra. The sum total was this: that

just as the horses, after their eighteen days' work in these two batteries of artillery, lost a certain amount of weight, so the whole of the squadrons, with the exception of six horses, lost on an average 35·5 lbs. after two months. They were weighed before the commencement of the experiment, after the first month, and also after the second month had concluded, and the result in the end was an average reduction, as I say, in the whole squadron, with the exception of six horses, of 35·5 lbs. The six horses had gained something under 6 lbs. apiece. What is to be learnt from that experiment? The horses had been doing comparatively little work; they were very fat; our stables at Norwich are dark, and that contributes towards the accumulation of fat, I think. They are also warm, and there is another inducement to fat. The simple lesson I learnt from that experiment was that I considered the horses had got rid of what was positively an incubus to them, and, if I may say so in the presence of the lecturer, what I consider, if they were going on service immediately, would be a danger to them, because horses grossly overloaded with fat are certainly, to my mind, more liable to inflammatory diseases than horses in fairly good working condition. Comparison has been made of the foraging of our Army horses with those of the German, French, and Russian armies, and, looking through the lecture yesterday I gathered that in those countries from which comparisons have been drawn, the nutritive value of the ration, as a whole, is considerably higher than ours. I began to think why it should be so. I think it is for this simple reason, which does not do us, as a sensible people, much credit, that with the exception of Aldershot, the Curragh, Dublin, and one or two other stations, it is impossible for our cavalry to carry out efficient cavalry instruction in the way in which it is possible for the German, French, and Russian armies to carry out their instruction, and for the simple reason that we have not the ground to do it on. Von Schmidt, the great cavalry instructor in Germany, insists on long advances of two or three miles. Where can we get that at Norwich, Brighton, Shorncliffe, Leeds, Manchester, or any other such place? We are put into a reformed turnip-field, and are supposed to do everything it is possible to do with cavalry, confined as we are in such a spot. Therefore it would be absolutely necessary that the nutritive value of rations in Germany and elsewhere should be greater than with us. Although we have a less quantity given, I am quite clear that in times of peace, and especially during the idle season, the winter season, when drill grounds are not available, our horses are over-fed. I am quite clear in my own mind from what I have seen that they are over-fed at that time, and possibly during the manœuvring season, of which we have had too little in this country, they are under-fed. If they were given the forage during the idle time at a reduced rate I am quite sure the Government would allow us to draw the balance during the hardworking season, and there would be no extra expense to the country. I do not think that there is anything which should prevent that being made a definite proposal. The cake that was referred to in the lecture is simply the horses' natural food under compression. 9 lbs. of that cake and 8 lbs. of hay produced an equal result at Aldershot to 12 lbs. of oats and 12 lbs. of hay, simply because it is crushed. Therefore, I think, if it could possibly be done, that the oats issued, especially at the out-stations, while they might be reduced in quantity, might with great advantage be crushed. We have gone a little way in that direction in my own regiment. We have now four chopping machines in the regiment at Norwich, and I suggested about a month ago that defaulters and the few men now and then in the cells, instead of having shot and pack-drill, should be told off in small parties under the orderly corporals of troops to cut the whole of the necessary chop for the troops in the morning. It is now done, and with very great advantage. One great advantage I would like to notice. The horses eat their food ever so much more slowly; there is no bolting of the food and scattering it about all over the stalls to be trodden down and spoiled; but the horses stick their heads into their mangers and munch away, quietly turning over the chopped hay, picking out the oats, and then finishing up with the chop that remains. It takes a horse one-third or half as long again to eat his food in the stable, with chopped hay under these conditions. I do not see, if we have hay-chopping machines, why we should not do something out of the canteen, or some other fund—the Government I do not suppose will pay for them—in getting some oat-crushers. I am quite sure it would be impossible to get crushed oats from

the contractors in a satisfactory way. There is no article of consumption for the horse which is so adulterated as oats *bought crushed*, but to buy oats in the ordinary way and crush them afterwards is quite feasible. There is another point I should like to touch upon. Dr. Fleming in suggesting by inference the changes indicated and the necessary inquiry—perhaps being in an official position in the matter—fought rather with the gloves, but I think there is one point upon which we ought to hit out pretty hard. There is no article paid for by the taxpayer, I believe, round which circumstances of corruption of the grossest form circle so much as the supplying of our horses with forage; I am quite clear of that. I could keep this meeting very much longer than the ten minutes which I am allowed by giving you the *ipsissima verba* of things which have come under my own personal knowledge, which I have run to earth, in the way of corruption in this matter. To take one very simple case, which unfortunately came to my cognizance too late to act upon. At a certain station and at a certain time every single Officer's groom in a regiment was in receipt of a shilling a month from a certain contractor. I should like to know where that shilling a month came from? It came out of the horses, it was saved out of the weight given to them. I know of another occasion where again through being unable to get evidence, we were foiled; in one day a thousand pounds weight of straw was issued short of what should have been issued. With regard to that very case before you which I invented, I got a letter one day from my manufacturer, telling me that when His Royal Highness had ordered a certain number of horses at Hilsa, which were in very bad condition, to be put on that cake to see how they did on it, about a week after this cake was issued, two quartermaster-sergeants of the troops stationed there came into the office. They said "Good morning" to my manufacturer. He said, "What can I do for you; what is your business?" "Well," they said, "we have come in the ordinary way of business. You have just got the contract for the supply of our horses, and we thought we would just look in and see how things were going on;" and so on. "What do you mean?" he said. "Well," said the spokesman of the two, "it is usual that some sort of commission should be given in order that things may be made to go easy." My manufacturer had very special instructions from me on this point, and he replied, "I do not know whether you know it, but Captain Graves" (I was then Captain) "is the inventor, and we are bound to him under articles of agreement, and anything that is done in connection with this cake we must put before him first." My manufacturer wrote to me giving me the very words that had passed, and I wrote back, taking steps that I flattered myself put a stop to that business there and then. The corruption that goes on with reference to the supply, both as to quality and to quantity, is something surprising, and ought to be made public and investigated in the most thorough way. We know the difficulty of getting evidence on this point; men will give you a vague report, they will say something about so and so, but as to coming to the front and stating it before a court-martial on oath, it is quite another thing, and it is very hard to get such evidence, and I believe the authorities are heartily sick of the job. I have now, Sir, a definite proposal to make which has been on my mind for some considerable time. Shortly it is this. When a subaltern joins a cavalry regiment, he is supposed to have been positively born in a butcher's shop, in a baker's shop, in the middle of a hayfield, and of an outfield; he is supposed to know good meat, good bread, good potatoes, good oats, good hay, good straw, good everything. He goes on with the ordinary orderly Officer of the day to be taught his duty. After a very little time he is put on duty for himself; he has to go down and to pass the rations, and a lot he knows about them! He goes to the gate, and there you will see a boy of about four or five months' service, very often less,—when we are hard up for Officers for duty,—passing in hay, and if you were to ask him the name of one single grass, as I did one fellow of my regiment, handing him a small tuft of Italian rye grass, he does not know it a bit. They have to pass this stuff in, and they know no more about it than the woman in the moon, if there were such a person. I believe firmly if the thing is to be carried out satisfactorily in the way of supply as to quality and quantity, the proper men attached to the cavalry and artillery and mounted corps who should pass these articles, are the Officers of the Veterinary Department themselves. There are a good many members of the Veterinary Department here,

and I hope they won't think I am trying to urge the necessity of increasing their duties, but rather that they will take my proposition as a tribute to their greater knowledge and higher education in this matter. I admit myself that I do not know enough about forage now, and I would bow to the decision of a properly qualified veterinary practitioner in a matter which so urgently requires investigation as this does. I believe arrangements could be made in each regiment, at each station, so that the forage should be presented at a certain time when the veterinary Officers were on the spot without necessarily increasing their duty. After that was done it could be distributed to the stables in the ordinary course, but for young and inexperienced subaltern Officers to have the power of rejecting or passing that which constitutes the mainstay of the horse's vigour, and the mainstay of the horse's usefulness, is to my mind utterly absurd. It is an important subject, and I do hope and sincerely trust that the Government may be led to take some steps to put it on a better footing. I do not think any better service has been done of recent years in this direction than that of the lecturer in bringing it forward to-day.

Colonel JOHN FRYER, C.B.: This is a very interesting subject. There are one or two points on which, if you will allow me, I should like to make a remark. I think we are very much indebted to the Principal Veterinary Surgeon for having given us such a very lucid, interesting, and useful paper. He was called to account for not having produced some plan or proposal for service and other matters, but that is exactly what he wants to hear us talk about. I think we are all agreed on one thing, and that is, that we in the British Army have been moving for many years on what I may describe as the rule of thumb with regard to the horse rations. I am of opinion, and I think many others without the least braggadocio will say the same, that we have very little to learn from any Continental Army with regard to the feeding of horses. I had the pleasure of travelling last winter in a great many of the capitals of Europe, and I cannot conceive anything more superior than the horses in London to those that you see in other European capitals. That is not caused by the breeding of the horses only, but by the care with which they are attended to and fed. I cannot help thinking we should do very much better by taking a leaf out of the book of some of our own great carrying companies which the lecturer has very properly brought forward to-day. Our rule of thumb is this, that we give oats, hay, and water. The oats are mostly foreign, and chiefly Russian. You may get 40 lbs. to the bushel, but with this very often a very thick-skinned oat, which will weigh heavy, and I suggest with all humility that it would be far better to have a mixed food for cavalry and artillery horses, such as we see in some of the rations of the great metropolitan companies. I have had practical experience of some of these companies, being rather largely interested in them, and I can safely say that no horse working either in the London General Omnibus Company, or the Road Car Company, doing the work that they do, could possibly live on oats and hay alone. Give him as much oats of the class we feed our troops on as you like, without other grain, and he will fall away in condition. Bulk also is necessary for condition, but I say we require to vary the ration by giving other grain with oats, and I should like to see that done very much. The next point we should inquire into is this. Does our present ration fulfil the requirements of our mounted branches in quality and quantity, or do we get as much out of the present ration as these great companies do out of theirs? My opinion is we do not, and for this reason, that we do not, as they do, chop and crush our food. By chopping you get the very essence of the hay and the essence of the oats; you get, in my opinion, quite 30 per cent. more out of chopped hay and oats than you do by giving it to them whole. There is one little matter which has not yet been mentioned, it is very cheap, and that is water. Water is the very essence of condition, no horse in the world will keep in condition unless you continually water him. "Water frequently" ought to be written up over every troop stable door—water, water, water. That is the one great secret of condition on a line of march or campaign, that the horse should be watered as often as possible. That may be outside the present question, but it is so. The lecturer said that the first action very often decides a campaign, but I think he will also agree with me that that army whose cavalry and transport stay the longest usually wins the campaign. Therefore the stayers are those which we hope to see in our cavalry, and cannot be attained without con-

tinuous care and attention in the feeding of the horse. I repeat, the two things we require are: 1st, that the ration should be varied when practicable; 2nd, that we should chop and crush everything if possible by steam power. I believe these two points to be mainly necessary for the maintenance of condition in our horses.

The CHAIRMAN (Sir Beauchamp Walker): I have little to say excepting that I very much agree with the Principal Veterinary Surgeon in what he has told us to-day. I should like to ask Colonel Graves what 2 lbs. of ration did you take off—2 lbs. off the hay or off the oats?

Colonel GRAVES: Off the oats.

The CHAIRMAN: And still gave the same amount of hay. There is no doubt that horses require a certain amount of forage in bulk, at least our English horses do; but one cannot help observing—knocking about the world as I have done for a great many years—how totally differently the various races of horses require to be fed. In the German Army, to which Dr. Fleming has alluded, with the exception of the very big horses which are allotted to the cuirassier and lancer regiments, nearly the whole of the horses of the old Prussian Army came from East Prussia, where they have breeding establishments of their own, and the only horses bought were the bigger horses, which are bred chiefly in North Germany and Mecklenburg. But there is a very strong infusion of Arab blood in the horses bred in East Prussia, and I had no doubt, during the long time I was in that country, that a great deal of their hardihood and endurance arose from that circumstance, because it reminded me very much of the horses with a more Eastern blood than our own which I had seen in other countries. It was extraordinary in Spain on how little horses did very hard work indeed: barley and chopped straw were the only forage we ever gave the horses there; and I believe in Arabia the horses do an enormous amount of work on a quantum of forage which people in England would hardly believe in—positively mere handfuls. You cannot in the Arabian desert, of course, have anything in the shape of hay; it really is nearly all grain, and a very small amount; I do not know whether Dr. Fleming can tell us.

Dr. FLEMING: 4 or 5 lbs. of barley.

The CHAIRMAN: There is a question I should like to ask Dr. Fleming—it reminded me of olden times—and that is what he thinks of sheaf barley as forage for horses, I believe any grain may be given, I believe even wheat on an emergency may be given to horses, if it is given with the sheaf straw. I had a remarkable experience of what sheaf barley can do while we were lying opposite Varna, preparatory to crossing for the Crimea. My then chief probably knew more about feeding beasts than any man in England. He had for a great many years looked after his own property in Ireland, and I believe had fed very largely himself for the Irish markets. One day he announced that the Commissary-General had informed him that we had no more forage for the cavalry. What on earth was to be done? He said: "It is no use putting the horses on too small an allowance. Horses must have a certain amount of bulk. If you do not give beasts a certain amount of bulk they are sure to go down." He said: "There surely must be something in the country." Now I had had a habit on the days I was not on duty of riding all over the country south of that part of Bulgaria towards the Balkans, and I had seen that the whole country was covered with ripe crops. I told Lord Lucan this. He said, "What have you seen?" I said, "I have seen quantities of barley, and they are just beginning to cut, in fact." I said, "If you will only look outside the tent you will see one field quite close to our camp." He said, "You come down with me to-morrow morning and we will see the Commissary-General." We went. The conversation was rather a curious one, and at last Lord Lucan said, "My Aide-de-Camp tells me that there is plenty of forage in the country, there is plenty of forage that can be bought. Now I know forage given in the sheaf can be used, even if it is barley, which is otherwise a very heating grain." "Oh!" said the Commissary-General, "that gentleman says there is forage in the country, does he?" Lord Lucan, with the sharp temper which he generally showed when he was being opposed, said, "Yes, if I buy the forage will you pay for it?" "Oh yes," said the Commissary-General, "I will pay for it." I bought 4,000 rations of barley before I sat down to dinner that day, and for nearly three weeks I rode all over the country with money in my pocket and bought

barley for our horses, for that portion of the force which had not gone up the country, and as far as my recollection goes—I was not doing regimental duty at the time, therefore I could hardly speak to it as well as some others—the horses did extremely well and thrive on that forage. Whether it would have answered for a continuance is another question, but I was particularly anxious to elicit a remark on the subject from Dr. Fleming. Water, as he says, does not form part of the horse's ration, but I wish he had said something about water, because I look upon it as nearly as important as the food. There has, I believe, a very good custom been introduced in all new stable fittings, and that is of having a receptacle for water which can be kept permanently filled. It was not so in my day, and I am afraid it is not very much the case in our barracks, but I hope as we are building new barracks occasionally that it may be introduced, because I am convinced it is a very great point. I also believe running water to be about the best water we can give a horse. I remember being with my troop a good many years ago during an election in Ireland, and I observed that the horses fell off after the first two days. In consultation with my sergeant-major, as I believe every Captain ought to be as much as he possibly can, he said, "I think if we watered at the river you would find a very considerable improvement." We went down and watered at the river and I took the horses back to Waterford looking very much better than when we left, which I very much attributed to watering them at running water every morning. I am afraid that altogether our stable fittings are much in the old style. Of all bad ways of feeding the hay, that of the high rack is perhaps the most hurtful: there is a great deal of waste and the horse's forelocks and eyes get filled with dust. I think in private stables now-a-days they are nearly all low feeding. I always crushed my own oats. I was a very poor man and very fond of hunting, and had very few horses. I tried to get as much work out of them as I could, and I always crushed the oats from the first day it was brought to my notice. I hope we may elicit from Dr. Fleming some opinion as to how he would modify our ration, because I always felt the reason why we had 12 lbs. of hay was that there was so much waste and it was for the purpose of giving the horse from 8 to 10 lbs. really to eat. I had one very good rule in my troop during the years I commanded one, which was that if I did not go and look in on the afternoon, my subaltern or some non-commissioned officers did and stirred up the stablemen to going round and picking up the hay that was pulled down and put it back again, because there is no doubt that in feeding from high racks there is an enormous waste of hay.

Colonel FRYER: One-third.

The CHAIRMAN: That reduces it to 8 lbs. The rest gets trodden into the litter, and entirely spoilt for consumption. Certainly 10 lbs. of oats is little enough for the big horses we have in our Service, if they are to do hard work. My hunters had 16 lbs. always, beside it being crushed, and beside a handful of beans in each feed. I think we are all very much indebted to Dr. Fleming for having given us these two lectures. I only wish there had been more Officers of my old branch of the Service and of the artillery to listen to them, and to give us the advantage of their experience, and by so doing to elicit replies from Dr. Fleming, which are sure to supplement the information he has given us.

Colonel COLVILLE: In the omnibus companies' stables the horses all have a receptacle in front of them for water, which is always full, and they drink how and when they like.

Dr. FLEMING: Mr. Chairman and gentlemen, I am very pleased indeed with the reception you have given my lecture. The paper itself is rather disjointed; the materials had to be collected from various sources, and some of them were derived from my own experience. Notwithstanding, the subject is a dry one, if you leave out the water, and it is a difficult thing to make it interesting to people who are not very enthusiastic in the matter of horses and horse feeding. I am only sorry we have not had a larger discussion on the subject, because from my peculiar position it is a difficult thing for me to make any proposals, and I was hopeful that the discussion which we might have had to-day would have informed me, to some extent at least, as to how to proceed in the matter of having an investigation into the foraging of our horses. Nevertheless, so far as the thing has gone, I am satisfied. I am extremely satisfied indeed with the remarks which have been made, and I

shall try to reply to the questions put to me to the best of my ability. The first question asked was as to the Syrian horses. The horses were entire. I do not think it makes much difference with regard to endurance : we have proved in India that the opposite conditions are just as good. It has been proved by the experience of cavalry Officers in India that horses which were not entire worked just as well as those which were, and did not fight so much with each other. My experience, in China especially, of a number of Japanese animals we had, was that they were perfect brutes, and, I think, it is the experience pretty well of everyone who has to do with horses, that they are much better when they are not entire, that their fighting and injuries are very few ; and not only that, but in reconnoitring, especially at night, entire horses will neigh, and if the enemy is within 2 or 3 miles he is sure to hear them. With regard to horses on shipboard, it is a matter for regret that our country is an insular country, so far as cavalry is concerned ; because it is absolutely necessary that cavalry horses should be in first-rate condition. If we have to put horses on shipboard, of course we run the risk of their good condition rather deteriorating on a voyage ; nevertheless, I contend that a horse in good condition is in a better state to withstand the voyage than if he were not in good condition. A horse sent on shipboard requires all the resisting power of good muscles and heart to endure bad weather at sea, and the horses which suffer most are those which are not in condition—that is, fat horses which have not had sufficient exercise before being embarked. The cavalry horse should always be in a fit state for a voyage, and the horse in the fittest state for the voyage is in the fittest state for active service. The rations, of course, differ from those which the horse gets on shore : they are adapted for the horse being kept in one position without exercise. With regard to the contract system for forage which now prevails to a large extent in this country, that was discussed in my last lecture. I know the system is a most obnoxious one, and all who have paid attention to it know that there is no part of the contract system in the British Army more exposed to cheating or robbery in every form than that which pertains to foraging, but the problem is how to get rid of it. At out-stations and small detachment stations it would perhaps not be expedient to send Officers to purchase the forage. I think permission ought to be given to the Officers who command regiments and detachments to buy the forage at first hand ; but that again would entail special knowledge, and that knowledge every Officer does not possess, though there is no reason why he should not. Every Officer who has to do with horses ought to know good forage from bad, and be able to estimate the value of forage in the market. If the system of contract could be abolished, and Government could buy direct from the producer, I think it would be much cheaper for the country and very much better for the horses. With regard to the reduction of the ordinary ration, this has been tried. I myself made the proposition, seeing the amount of damage our horses often sustain in the stables during the winter season, and especially at out-quarters. In one of the cavalry regiments in which I served, it was our custom to diminish the allowance of oats in winter, and to give what was saved to the horses during the summer drills. Of course that was not always easily done ; large barrels had to be provided, and sometimes we got the order to march before the summer drills began. But I was moved more particularly to make the suggestion from the fact that the casualties in winter in stables are very often much greater than in summer, from the fact that the horses are fed in winter as in summer, and not getting the same amount of work in winter, they amuse themselves by breaking each other's legs. It was proposed that during the winter season 2 lbs. of hay should be substituted for 2 lbs. of oats ; that, instead of 10 lbs. of oats, 8 lbs. of oats should be given, and instead of 12 lbs. of hay 14 lbs. of hay. The reports as to the result were of the most contradictory kind. One regiment had not been put on this altered ration long, before it was noticed that all the horses were starved-looking and weak, and a very great sensation was caused. At other stations at the end of a certain period the reports were favourable so far as the horses were concerned ; they were in good health, and the casualties fewer than usual. From other stations, again, it was reported that the horses had lost condition, and were altogether unfit for the spring drills. So that the reports would tend to prove that it is not safe to reduce the present ration, either in summer or winter. This I do

not agree with. I have already said that the horses should be fed according to their work: beyond a certain amount they should receive forage in proportion to the amount of exertion they undergo. I think if horses are standing in stables, doing little work, they ought to have fewer oats; more hay should be allowed if necessary, but some of the stimulating food should be withheld. Oats should be given in largest quantity during hard work. I think the present ration might be improved, so far as the materials are concerned. To keep horses upon oats and hay all the year round must be unsatisfactory for them. Some variation might well be made, and we have the example of large companies which employ heavy and light draught horses to show that a mixed ration is necessary and beneficial. If these horses were fed all the year round as our troop horses are fed, I do not think they would perform the same amount of work they now do. We all know that a mixed diet is necessary for ourselves, and it must be the same with the horse. I think if the oats were mixed at intervals with beans or maize so as to make a variation, it would be all the better; but, nevertheless, I do hold that horses should be fed in peace-time as you intend to feed them in war-time: therefore, if you gave them a mixed ration in peace-time they should also have it while on active service. With regard to sheaf wheat or barley, there is no doubt when the grain is pretty well ripe and the straw dry it may be used as food; but if the head is green and the stalk contains much sap, so that there is too much moisture, it will damage the horses. Of course wheat or barley given to horses unaccustomed to it is not the same as oats. We have the fact that in South Africa English horses, when they first arrived there from England, were fed upon "oat-hay" and did well, and there is no doubt that the unripe grain given in the straw is much safer than the grain itself. With regard to water, of course that is only part of the horse's ration on shipboard; it is not taken into consideration in connection with forage, either at home or in the field. It is most important, as has been said, that horses should have as much water as they can drink, and they ought to have water always before them whenever possible. If horses are kept from water a long time, they take an inordinate quantity, which is likely to do them harm, and I am extremely sorry that even in our new barracks the water trough, which is now so common in the stables of civilians, is not present as a part of the manger fittings. We have one improvement, however, the rack is on a level with the manger: the overhead racks are abolished; still I should be very glad indeed to see the water trough alongside the rack and manger. The modification of ration which we might hope for should be something on the scale of the German Army. As already stated, horses should be fed according to their size and the amount of work they do. I think there ought to be a peace ration and a war ration. A light cavalry horse weighing 700 lbs. cannot require, and therefore should not receive, the same amount of forage as a horse weighing 1,200 or 1,400 lbs. A horse standing in a stable, well groomed and kept warm, does not need so much food as a horse standing out in the open, exposed to the weather. I think there ought also to be a garrison ration and a manœuvring or field ration; when the work is inordinately severe, let the ration be still more increased. The German scale of rations is, I consider, a good one, and it is well proportioned to the horses and their work. You will see a great divergency between the German and French rations. The French mounted corps for some years have been complaining about the underfeeding of their horses, and some experienced Officers of cavalry in the French Army say that their defeats by the Germans were largely due to the French horses being underfed and the German horses so well fed. This point is noteworthy, because if you compare the two scales of rations you will find a very great difference. I do not think I have anything more to say on the matter. The discussion has been satisfactory, but I am sorry we have not had a larger attendance of experienced Officers, so that we might arrive at some definite conclusion as to really what the forage rations should be.

The CHAIRMAN: It only remains for me to ask you to empower me to give Dr. Fleming a vote of thanks for his excellent lecture.

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and the 30th June, 1889.

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Haworth, F., Lt.-Col. 3rd V.B. Lan. Fus.	Symons, W. P., Col. S. Wales Bord.
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THE FIELD ARTILLERY IN ITS POSITION UNDER THE COMMAND OF GENERALS OF ARMY CORPS DISTRICTS.

By PRINCE KRAFT ZU HOHENLOHE-INGELFINGEN. Translated (by permission) by Lieut.-Col. WALFORD, h.p., R.A.

Introduction.

THE radical changes which the field artillery has undergone, owing to the abolition of the Inspector-General of Field Artillery and to the fact that this arm, like the infantry and cavalry, is now placed under the General Officers Commanding Districts, consist mainly of the following:—

1. In future the Supreme Court of Appeal, with regard to the details of the training of field artillery, will only exceptionally (that is, only when the General commanding happens to have served in the artillery) be presided over by an Officer of the arm; the same rule will also hold good with reference to inspections.

2. The principles of the tactical employment of field artillery will henceforward be brought to light by the Officer commanding the troops alone, and this during the exercises with the other arms; the superior Officers of the technical arm will have nothing to do with the matter.

3. Personal questions, such as the career of the Officers of the arm, judgment with regard to their efficiency, matters affecting their honour, &c., will henceforward come before the highest authorities through the Generals of Districts, and such questions will thus be dealt with in the artillery exactly as they are in the infantry and cavalry.

I. The Course of Elementary Tactics.

Many a gunner of the old school will shake his head when he hears that the General of a District, who may have passed his whole service in the infantry or cavalry, is now to be the highest Court of Appeal with regard to the inspection of field artillery, and that his criticism is, within the limits of the corps, to be decisive as to the future course of training of that arm; and many thoughtful Officers of the other arms will perhaps consider his

doubts to be entirely justified. There will indeed be found not a few Officers of infantry and cavalry who will, in their modesty, believe themselves to be quite incompetent to supervise the training of field artillery in detail or to inspect and criticize their elementary tactics, since they will feel convinced that they know nothing about them.

It certainly cannot be denied that the long-felt and frequently expressed wish of the artillery, to pass entirely, permanently, and, as a matter of organization (even in peace), under the command of Generals of Districts, arose in part, even though those concerned had not the least idea of the fact, from their experience that they have always been praised by these Generals on the rare occasions on which they have up to the present been inspected by them. Never have they been seriously found fault with by any Officer who had been brought up in one of the other arms. For such Officers did not consider themselves authorized, indeed were not so under the former organization, to notice and reprove faults in elementary tactics. This was the duty of the "technical superiors." For if, under the former organization, the General of a District had reproved any faults in elementary tactics, he would have found himself exposed to the risk of a conflict of authority with the Inspector of Artillery. He had every reason to avoid this as far as possible; since, owing to the nature of the organization of the artillery with its double system of command there were already plenty of opportunities for friction and the conflict of authority. For this reason the General in command seldom felt any desire to concern himself with questions relating to the elementary tactics of the artillery. For, indeed, they are not sufficiently interesting to induce him to study them seriously, while he has, moreover, other things to do than to work at the details of matters which do not form part of his duty. An inspection of artillery by a General in command was formerly little more than a compliment (and a sort of holiday for the men) offered by that Officer to an arm which was only half under his command. When this holiday was over then came the "technical superior," like a sort of devil's advocate, from whom the troops heard nothing but blame, since all possible praise had already been lavished upon them. It is thus not wonderful that these technical superiors were disagreeable to the troops, and that the latter desired to be rid of them altogether, and to be placed directly under the command of the General of the District, who was so delightfully kind. I must at this point expressly warn against any suspicion that I at all suggest by these words that the artillery Officers had any intention to throw dust in the eyes of their non-artillery superiors. These feelings, as I have already said, produced their effect without the knowledge of those concerned. They are too human and too natural not to be altogether pardonable. When I look back on past inspections, I cannot myself claim immunity from the same feelings.

It would certainly be a great evil, if the future inspections of field artillery by the General in command were, as they used to be, regarded merely as an act of politeness, or were to be considered by the men simply as a holiday; for when troops are only praised and never blamed they are sure to fall off.

The question arises, whether this evil will be a consequence of placing the artillery under the command of the General of the District.

This question is identical with another, namely, whether Generals who have not been brought up in the artillery will venture to supervise and inspect the training of field artillery in elementary tactics, and whether they are rendered capable of doing so by their military past.

In order to solve this question, it is necessary to lay down distinctly and exactly how far a General in command ought to concern himself with the details of elementary tactics, and also what are the peculiarities of these details.

As far as the position which a General in command holds to the different arms which are under him, and as far as the time which is at his disposal will permit, it is established that it is his duty to inspect every regiment annually when its training is completed. But, since they have, in addition, to give their opinion regarding the fitness of the field Officers for regimental commands, Generals usually arrange to be present also, as far as possible, at the inspection of battalions by the Divisional Commanders, and they are thus able, at least once in every two years, to see each battalion once exercised in detail. When time will permit, and when they have special reason to pay particular attention to some one or other of their subordinate Officers, they are allowed here and there to be present at the inspection in detail of yet smaller bodies of troops, and we not unfrequently see the head of an army corps at the inspection of a company or a squadron, or even at an inspection of infantry recruits or of riding in the cavalry. But such attention to minute details forms certainly no part of the duty of a General in command. It is only absolutely necessary that he shall inspect a field Officer's command (which in the artillery consists of a complete brigade division of three or four batteries), and shall be in a position to thoroughly criticize their training.

What then are the details with regard to which he has to give an opinion?

First of all the general military appearance, the carriage, the equipment, and the training of the men; and, secondly, the elementary tactics of the troops, which finds its highest expression in service practice.

No one will deny that every General can give a valuable opinion on the former question, whether the troops he inspects be infantry, cavalry, or artillery. The carriage of the men, their dress, correct instruction in the military duties of soldiers, and military matters in general, are in all arms judged by the same standard. It may perhaps be objected, that a General who has served only in the infantry will be an indifferent judge as to whether the fitting of the harness and the arrangements for draught of the artillery have been well carried out. But anyone who has a military eye for things in general will see at the first glance if there are any grave faults in this respect. An Officer of such high rank neither will, nor ought, to trouble himself as to whether every trace is correctly hooked in, or every hame is exactly fitted, or with any such details; any more than, if he has previously served in the infantry, he need pay attention to whether every chin-strap in the squadrons is correctly put on.

With regard to the second point, the *elementary tactics*, everything is already laid down in the Regulations. It is certainly neither desirable, nor is it within the limits of possibility, that the Artillery Regulations should be so entirely a second nature to a General who has never served in that arm as they are to a field Officer who has grown gray among the guns. But, if we look through and consider the details of the several parts of the Artillery Regulations, we shall find that such knowledge is not necessary to a General, if he is a sound and experienced man and has all arms under his command, in order to enable him to be in a position to fully inspect and criticize artillery in their elementary tactics.

The first portion of the Drill Regulations relates to *Foot Drill*. Now everyone will agree that a General in command must be able to give a valuable opinion with regard to this. The trifling differences in foot drill between artillery and the other arms, which arise simply from the fact that some of the men (the drivers and horse artillery) wear spurs, while others do not, are of no importance. It would indeed be a very good thing for the field artillery if they could now and then get a few hints from a sound infantry Officer about their foot drill and about training in marching. The artillery take the gun as their unit, the infantry take the man. The artillery there-

fore attach the greatest importance to the good effect (a consequence of good training) of their gun, while the instruction of the infantry finds its highest expression in the greatest possible perfection of each individual soldier. It thus comes about, that in the field artillery the care of the individual soldier does not always receive so much attention as is its due. This usually becomes evident by the carriage of the men and by their foot drill, for these drills are generally carried out *en bloc*. We are often pleased when the few evolutions which are called for have been carried out according to the Regulations, and entirely fail to realize that a free, unconstrained, and natural march must be developed by individual instruction, or again what an excellent effect such individual instruction and a correct attitude in marching have upon the health, the discipline, and the spirit of the man. I have certainly often been told that the artillery have a host of things to learn, and have no time to expend in so much trouble about marching. But this is quite wrong, for a raw untrained man can be much more easily and quickly taught to acquire a correct, free, and unconstrained action in marching, when the instructor gives him good individual instruction, than when he from the first squeezes his recruits together in rigid order, and puts them through the evolutions as a body. Moreover, since the improvement in small arms and the growth in importance of individual fire in action, the infantry soldier has at least as many things to learn as the gunner.

On this point a General who has come from one of the other arms will be a better critic than a field Officer who has grown gray among the guns.

The next part of the Drill Regulations refers to *Standing Gun Drill*. This is certainly that portion of artillery work which a non-gunner will find the greatest difficulty in criticizing. And yet it is one of the most important items with regard to the effect of the arm, for it will be obvious to every thinking soldier, that a battery of which the guns are badly and carelessly served cannot make many hits. We need only remember that a gun laid incorrectly, or a tangent scale wrongly adjusted, must cause a miss. But a General who has even only once attentively watched artillery at gun drill, will quickly learn to recognize whether the service of the guns is correctly carried out. Owing to the difference of the functions of individuals in the service of a gun, active gunners soon draw attention to an insufficient accuracy of drill by the loud hints which they give each other, or which are tendered by the Officers and non-commissioned officers. No other troops are so absolutely obliged to speak loud as are the artillery. A General who knows this, and who proposes to make standing gun drill the object of his inspection, will content himself with giving a sharp reproof whenever he hears anything beyond loud, ringing, regulation words of command. If he goes a little further, and every now and then looks over a gun before it is fired, and convinces himself that the elevation which was ordered has been given, he will, as far as regards detail, have done all that he can do, whether he be a gunner or no. But he will seldom have time to make a special inspection of standing gun drill. The Inspector-General of Artillery could only do so exceptionally. He used to form his opinion with regard to the gun drill when he inspected the drills with horsed guns, and also at service practice. I shall come to this later on.

Another section of the Regulations refers to *Instruction in Driving*. With regard to this practice, it is also no part of the duty of an Officer of such high rank as a General in command or an Inspector-General to judge whether the corners and turns in taking ground or in wheeling are correctly carried out according to Regulations, by the different pairs of the six horses, or whether the driving when limbering up or coming into action follows exactly the right curve. Attention to this can, and must, be left to Officers of lower rank. It will be sufficient if the rates of march at the different paces be correct

(which may be checked by an Aide-de-Camp with a watch with a second-hand, if distances be taped out and marked on the drill-ground), if the columns move evenly at a rapid pace, without any checks or hurrying and without losing their intervals, and again if there is absolute silence among the troops and nothing is audible beyond words of command and trumpet calls. He will not trouble himself at all with regard to the old, but ever new, questions of the instructor in driving, as to whether, and when, a short wheel or a wide wheel is to be used. He will usually make no special inspection of driving drill, and will not attend the elementary driving in the *manège*. He will, at the most, in cases where young Officers have arranged to form a class for instruction in driving, do them the honour of being present at a part of their drill. With respect to the rest, his time will as a rule be too limited to allow him to judge the driving of the troops except at the drills with horsed guns, while in that the three criterions, which I have before named, viz., pace, evenness, and quiet, will be sufficient to enable him to form and give a well-grounded opinion.

From what has been said above it follows that the General, beyond occasionally seeing a foot parade, need only inspect *Drills with Horsed Guns* in order to go as far into the details of field artillery as is in accordance with his high position. With regard to this particular exercise he will, as a commander of all arms, consider it from the point of view that the artillery must be in a position to carry out whatever he may demand from it in war.

What are the demands which he will make upon it? He will realize that it must be at the right moment in the position where he needs it, and that it must be able to shoot well wherever he employs it. In order to arrive betimes into position, it must be able to get over distances of such length as may be consequent on this duty, and this either in column or in line at a rapid pace (a trot), and in line at a gallop also; in doing this it must not become disordered, nor must the horses be overstrained, while it must advance into its fire position in good order, quietly and with confidence. How great are the distances which field artillery must be by practice accustomed to traverse?

The greatest distance which a mass of artillery has, under ordinary circumstances, to pass over at a rapid drill pace, is that which must be traversed when the corps artillery is ordered to hurry up to the head of the corps for action. We know that the corps artillery marches, as a rule, in rear of the leading Division of the corps. When an engagement develops itself at the head of a corps on the march, and the corps artillery is directed to take part in it at once, the latter will have therefore to move at a rapid pace over a distance equal to the length of a Division in order of march. It must after that form line and advance into its position. The General therefore can, and must, require it to trot in good order in column for a distance of 6,000 paces, and then to gallop 1,000 paces to the front; in other words to trot for twenty and gallop for two minutes. Far greater demands than this may be made upon field artillery in war. It may have to march many miles at a rapid pace. But such forced marches scarcely come under the head of exercises, since during them there will be intervals of walking and of halting, in order to let the horses get their wind. These movements are thus forced marches and not drill movements.

The above advance will in war, at least as far as relates to the trot in column, be ordinarily carried out on high-roads or made roads. The General can therefore inspect it on the open drill-ground, without failing to keep up the likeness of war. With this object he can cause field artillery to trot round the drill-ground for twenty minutes (his Aide-de-Camp checking the pace by the marked distances), and finally he can order them to advance into their fire position by a gallop to the front of two minutes. But I must not

omit to say, with reference to this matter, that the column of route is the formation which will be exclusively used in war. If the General desires, however, to make a slight change, he may direct that the force shall form column of sections for the latter part of the column movement. When the evolutions necessary for all this are carried out by a mass of artillery (a brigade division or a regiment) at the regulation pace (300 paces per minute for the trot and 500 for the gallop), without talking or any irregular suggestions on the part of the Officers and without any checks or hurrying in the column, in such a manner that the line of artillery stands finally ready for action in the selected position,¹ the General will know that this artillery can give him all that he must ask from them; he need go no farther than this into the details of the exercises with horsed guns. He certainly need not be a professional gunner in order to form a correct judgment in this matter. On the contrary, I am almost inclined to believe that a General who is not a gunner will inspect such masses in a manner more in accordance with the conditions of war than if he were a professional artilleryman. The latter is a little inclined to ride artillery hobbies, to call for complicated drill movements, and to attach inordinate importance to good driving, exact right angles, neat deployments, &c., whereas a General, who is simply a Commander of troops, cannot even in peace desire more than he must demand in war. The latter will, therefore, inspect in a manner more in accordance with service conditions, and his criticism will, as used to be said, "smell more of powder and ball."

We have not long since known cases where the professional gunner, as the war period faded more and more into the past, fell farther and farther away from his true war duties, and thus took to drill problems which could never be used in war, such as the half-column in sections, the line of columns of sections, and other peace manœuvres, which were borrowed from the cavalry, but are quite valueless for artillery.

After the fire position has been taken up, the General will ride along the line of batteries in action, and will observe whether the service of the guns is carried out smartly in military style; he will thus, as I have said above, inspect the standing gun drill.

It may happen (and there is no order against it) that a General may wish to make at his inspection a more exact inquiry into the efficiency of individual batteries for war, and also into the value of individual battery commanders. He will find it most easy to do this, if he orders the mass of artillery to be led into a position² to which the whole force must advance by batteries. He will thus have every facility to carefully observe each battery and each battery commander; if this evolution is carried out well and in good order, the troops are efficient as regards their elementary tactics. This is of all evolutions the one most in accordance with war conditions, since it is very frequently used in war. For when a mass of artillery comes up in column at a trot, and the Commander wishes to open fire at once, the leading battery will in most cases form line, open fire and find its range, the other batteries coming up in succession as they arrive. Moreover in very rare cases will the ground permit an entire brigade division to advance on its full front with the correct intervals.

In the three great battles of Königgrätz, St. Privat, and Sedan I only once saw a brigade division advance in line; this was in the first position at Königgrätz. In every other of the very numerous cases the advance took place by batteries.

If a General thus inspects the "exercises with horsed guns" of a brigade

¹ Against a marked target, and following a pre-arranged tactical idea.

² Against a marked target, and according to some simple tactical idea.

division which has completed its training; that is to say, if he first inspects it in line, then makes the above-mentioned long movement, then watches the service of the guns, and finally makes it advance again into position by batteries, he will be able within an hour to form a correct judgment as to whether the troops can meet the demands which he must make upon them. A regiment will require an hour and a half. In this estimate I have allowed for two marches past, each in a different formation. The horses must be in very fair condition if the troops are able to carry out such continued movements at a rapid pace. Horses in bad condition, badly fed or with bad legs, will be no more capable of carrying them out than will those which are overfed. The General will thus, when he inspects the first position, be able to judge of the condition of the teams.

It appeared at first almost an anomaly when I said that a General who is not a gunner is in certain respects better fitted to inspect a mass of artillery than a senior Officer who has grown old in the arm. But such phenomena have been not uncommon. Frederick the Great himself was decidedly not a renowned horseman. He used to hit his horse over the ears with his cane. But he knew better than anyone, either before or after him, what he could and must demand from the cavalry. But I own that every General is not a genius, as the great King was. I have, however, known many practical infantry Generals who understood right well how to use cavalry, and what they must demand from them, and who moreover improved cavalry matters by their criticisms. If it be said that I ought to confine myself to artillery questions, I will ask who brought about the enormous improvement of field artillery, by showing the need for rifled guns? Was it not King William I, supported by the Chief of the General War Department, General von Voigts-Rhetz, both of them Infantry Generals? And they did this in spite of the opposition of the then Inspector-General of Artillery.

It is obvious that a General who proposes to inspect artillery must be so far acquainted with the nature of that arm that he knows how and where he would use it in action. But so much we may very well expect from each of our Generals, since they are called upon to handle all arms in war, and must therefore know how and where to do so in peace.

But the *Practice*. Every non-gunner will from the first consider that only a gunner can inspect the practice of artillery. Everyone is accustomed to believe that there is something specially secret in the practice of artillery, and that it can be appreciated and understood by the initiated only; so much so that people often fancy that no layman may dare to lift the veil from before this sacred mystery, and that only one of the "illuminati" is in a position to form a judgment concerning the practice of the arm. A few decades ago, the artillery surrounded their art of shooting with so much scientific mist, that everyone else thought that, in order to form an independent opinion on the practice ground, one ought to be learned in mathematics, physics, and chemistry. But since then, the artillery have burst asunder the fetters of technical science, as His Majesty the Emperor Frederick III very accurately remarked, and have laid down the mask of learning. Moreover, the infantry have with their rifled arms practised the principles of the art of shooting, and were indeed for some time in advance of the artillery. What then is the theoretical difference between infantry and artillery practice? At the most this, that the artillery has the larger shooting machine and the larger shot. On the other hand, artillery practice is the simpler and easier of the two, since the gun stands fast, while the shooting of infantry is complicated by the fact that the rifle is held to the shoulder. It is not necessary to be able to calculate either parabolas or the resistance of the air, in order to know that a high tangent scale gives a more curved

trajectory and a greater range than a low one. And if the artillery now possesses a special kind of practice, that with shrapnel, no one need be afraid to give an opinion concerning it. Any person who has, even only once, stood sufficiently near to the target to be able to see the effect of shrapnel, will quickly obtain a full insight into the nature of this kind of practice. Has not every General and every Divisional Commander, even though he may have passed his life in the cavalry, to form an opinion concerning the practice of the infantry regiments which are under his command? As he is now bound to pass judgment on the more difficult, he will certainly be able to criticize and inspect the simpler form.

The results of the practice of infantry can be even examined and judged in the study from the Practice Report alone. I might almost say that this is possible with artillery practice also. In order to make it so, nothing, in my opinion, beyond one order is required; in the practice regulations of the infantry a rule is laid down that every knowingly false score on the target shall be punished (by court-martial and not merely by the Commanding Officer) as a false report. A similar regulation with regard to the range-party is very desirable at artillery practice; this would make the practice report so trustworthy that all Officers would be able to judge and criticize artillery practice also (at any rate, the elementary practice) by simply reading the practice reports in an office.

An inspection on the spot would be desirable only in the case of the service practice of the artillery (which may be compared with the field firing of the infantry), less, however, for the purpose of seeing how the troops shoot, since that can even in this case be learnt from the reports, than in order to see how they carry on their practice.

In my opinion the General would do best if, on the day of inspection, he remained during a part of the practice in the neighbourhood of the troops, and during the other part in the neighbourhood of the target. While he is near the troops he can observe whether the batteries advance into position in good order and in a soldierlike manner, whether confidence and quiet govern the service of the guns (uncertainty always shows itself plainly by much talking in addition to the words of command), whether the battery commanders keep their fire in hand, whether they order the proper corrections, and how they appear to be skilled in the observation of fire from the battery. When near the target he would know by the first shot whether the range has been at once correctly judged. The continuation of the practice would show him whether the first shots were exactly observed and whether the troops found the correct range, so that the effect of the fire may be eventually consistent with the accuracy of guns of precision. For, if the matériel be good, the effect in hits offers the best standard by which to judge of the excellence of the service of the guns and of the conduct of the fire; it is thus also a criterion of the elementary gun drill. While the artillery still had smooth-bore guns, it was within certain limits a mere chance where they hit. But now that they have rifled guns, good shooting depends upon the service of the guns and the conduct of the battery. No battery can shoot well unless it be well drilled and well worked. A battery which is badly trained and badly managed can hit nothing. The General will thus best judge by results with regard to the elementary tactics of the battery.

If he has any time left on the day of inspection, and can thus be present at the comparison of the practice report with the observations from the battery (which takes place by regulation after every practice, for the information of the Officers), it will be so much the better. For he may thus best learn to know his subordinates, as to how far they are skilled in observation of the effect of fire, and as to what was their personal opinion while the practice was being carried on.

It would be very desirable that many Officers of the other arms, and at least all Generals, should once every year attend a comprehensive practice of artillery (when possible on the day of inspection), since in war every General will probably have artillery, even if only temporarily, under his command, and will in any case have to stand under the fire of hostile artillery. For on the practice ground the strength and the weakness of this arm are plainly visible to the eyes of an observer, without any necessity for wearisome study on his part.

When the position has been taken up, and before the commencement of the fire, it will be observed, if an effort be made to estimate the range, how difficult it is to get a clear view of the target, even at medium ranges. The range of 2,000 metres is certainly one at which in these days the fire of artillery may be annihilating, if it is in the main accurate. But can the enemy be always visible at a distance of more than a mile, even if he be not behind cover? If the light be unfavourable, or the weather foggy, or if a wood of greater height than the target stand behind it, it sometimes happens that an enemy posted in the open altogether escapes notice. In order to give our practice an air of reality, we use on the practice ground some means of imitating the smoke and the noise of the enemy. It not unfrequently happens that these first enable us to catch sight of the target. From this fact every thinking soldier will draw the conclusion that at long and medium ranges the assailant will be often able in war to open fire before the defender, since the latter will not see the former until he commences to fire. And this will take place in war even more often than we should be prepared to expect, judging by our experience at practice; since in a battle which has once got into full swing the attention of the defender's artillery will frequently have been already drawn in another direction.

Again, we can see on the practice ground, and this before the fire opens, how difficult it is to judge such long distances, even approximately; and 2,000 metres is really only a medium range. But great mistakes in the original estimate of the range add enormously to the length of time required for ranging.

As soon as the fire commences we shall notice how difficult is the observation of the shots. The shell is the best range-finder which has up to the present been invented. But how difficult it is, under unfavourable conditions, to observe fire with accuracy, and to be certain whether a shot has been short or over; this will be very evident on the practice ground. Let us suppose, for example, that a few hundred paces in front of the target there is a depression in the ground, in which the first shell bursts, the range having been judged so much too short. The smoke of the burst will not be visible until it has risen and grown thin, when it will look as if it was behind the target. We shall imagine consequently that the shell was over, and shall therefore reduce the elevation. It is within my experience that very well trained gunners have fired away the whole of their ammunition without a single hit, and I have seen in battle a long line of artillery firing for a considerable time from one position, and shooting 500 paces short, until at last I told them of the fact from my own observation. There are in battle even greater difficulties; not only does the enemy's fire confuse us with the smoke and the flashes of his guns, but sometimes also several batteries are firing at the same target, and we are thus left uncertain as to which of the bursts which we observe is that which must govern our corrections. In my experience we have been for half an hour in this state of uncertainty, until at last I gave the order to fire salvoes by batteries, which gave us a group of six simultaneous bursts, and could thus be more distinctly observed.

Arrangements are now made at all practice grounds which render it possible to fire also at moving targets. Any one who has, even only once, been

present at such practice will see clearly how seriously the difficulties of observation and correction are increased when the target can change its position. These difficulties are still greater when the target moves not only in the direction of the line of fire, but also across it. Infantry can easily follow with their rifles the crossing movement of a target, but the gun is a fixed firing machine, of which the trajectory can be quickly changed by using the elevating gear, but of which the traversing to either side is much more difficult. A single shot which is wrongly judged when firing at a moving target (for example, if it be thought short when in reality it was over) may lead the Battery Commander into such errors that he may throw away all his ammunition by firing over the target. The nearer the target comes the greater will be the effect of such doubt upon his nerves, and he may thus become very excited, especially if the target moves quickly. But perfect calm and quiet calculation are absolutely necessary if the observation and correction of fire are to be accurately carried on. A Battery Commander who is excited and uncertain will rarely hit anything. I have seen well practised Battery Commanders who, from sheer anxiety to do well, have become so excited on the practice ground, owing to the presence of many and distinguished observers, that they could hit nothing at all. It will be obvious what enormous effect such physical conditions may produce when the target in battle is a charging enemy, who will capture the battery if he is not shot down. The consequence of this is that the most effective projectile of field artillery, a shrapnel which bursts in the air in front of the target, is very seldom of use against a quickly moving target, since the setting of the fuze of a shell which has once been entered into the gun cannot be altered.

A cavalry Officer who watches artillery practice may thus draw conclusions from it, as to how he ought to act when he wishes to capture a battery in action. He will neither walk nor halt for a moment while within sight or reach of the artillery, and will during his movement of attack, if the available space and the character of the ground are suitable, by no means go straight at the battery; he will prefer to incline first to the right and then to the left, in order to oblige the enemy who is laying on him to continually change his line of fire, and thus to make him nervous. It will also be a great advantage to the attacking cavalry if they charge the battery at the same moment from different directions, and thus divide the attention of the artillery and encourage errors.

On the other hand, an observer on the practice ground will see most distinctly that artillery when firing at short ranges at a standing target can and must hit with (I may say) every shot. The range of from 1,000 to 1,200 metres is now a very short one for artillery, while for infantry it is almost the limit of effective fire. It would be an excellent thing if, in the presence of Officers of the other arms, a battery and a company of infantry might annually fire simultaneously at similar targets, in order to show observers that between 1,000 and 1,200 metres artillery has from thirty to fifty times the effect of infantry, while the latter (allowing for an equal expenditure of time and of weight and cost of ammunition) will not succeed until they arrive at 500 metres in equalling the effect of the artillery at 1,200 metres. An infantry Officer will thus learn that if his attack is directed against artillery he will do well to pay no attention to the enemy until he has pressed on without a check to within 500 metres of him. The experience which he will gain on the practice ground, that artillery can at a range of from 1,000 to 1,200 metres exactly measure the distance of the target, will further teach him never to neglect to obtain information from the artillery, as he advances past it against the enemy, with respect to the range at which they are firing, for this will give him a starting point from which he can, by counting his paces as he advances, decide when he has arrived at 500 paces from the target.

For it is notoriously very difficult for the infantry, even at 500 metres, to see whether the small bullets of their rifles fall short or over.

Observers who stand near the targets can see the effect of the projectiles of the artillery. They will notice that this effect extends farther in depth than in width. They will thus acquire the conviction that dense, and above all deep, targets offer the most favourable objects for the fire of artillery, which is consequently most effective against columns. Cavalry and artillery will conclude from this that they must avoid all column formations if at any time they are compelled to show themselves within effective range of the enemy's artillery, and that they may expect to suffer the least possible loss from such fire if they can take up an extended order of battle.

III. *Applied Tactics.*

The fact that field artillery will in their course of applied tactics be directed by Officers commanding troops of all arms is not absolutely dependent upon the new organization, since they used even formerly to be told off at the detachment exercises and field manœuvres to Generals of Army Corps, Divisional Commanders, and even to Officers commanding brigades. But this was rather a matter of form as regarded the details. Very great importance was attached, even at the manœuvres, to the judgment of the artillery superior Officers. Differences of opinion and conflicts of authority were thus certain to occur, to the great disadvantage of the troops themselves, who often did not exactly know whom they ought to obey. In most cases, therefore, the Officers commanding the troops gave up the "technical troops" to the command of their "technical Officers." The former often preferred not to trouble themselves about this arm, which was only temporarily and indeed only half under their command. The troops themselves were obliged to be guided principally by the opinion of the "technical Officers," since in their hands lay their weal and woe and their future career. But this half-and-half arrangement, as I have already stated in another place ("Letters on Field Artillery"), had a bad effect upon everyone, especially as regarded the discipline of the troops.

But this half-and-half arrangement is now at an end, since the field artillery is now altogether placed under the Generals commanding Districts. Henceforward the qualification returns will pass through the hands of the General in command, and every artillery Officer will say to himself that in applied tactics (for example, at exercises in combination with the other arms) he simply has to work by such principles as shall be recommended to him by these Officers as correct.

The General in command knows already, from the requirements of his other troops, what he must demand from his field artillery, and has further seen, at his inspections of elementary tactics on the drill ground and on the practice ground, what he may expect and require from their assistance.

Thus the first duty of the artillery is to beat down that of the enemy. The power of the gun teaches us that this can be decisively done at a range of 2,000 to 2,500 metres. Nevertheless, the necessity of protecting the advance of the other arms from the fire of the enemy, and of dividing the enemy's attention, will in most cases oblige us, when acting on the offensive, to open fire earlier at yet longer ranges. If this be done we may reckon on being able to come into action, without suffering serious loss, in positions which offer suitable ranges (2,000 to 2,500 metres) for a decisive artillery combat, and even sometimes to surprise the enemy by so doing. If, however, the character of the country is such, that we can march into these positions without being seen by the enemy, it will then be better to advance into

them at once, without delaying in a more distant position. If we succeed in escaping the enemy's observation until we open fire, we have then surprised him, and there is a considerable probability that we shall find our range, and therefore hit, before he can do so, if only we carry out ranging with the greatest possible calm. We shall then be able to change to shrapnel fire, which indeed is decisive in the artillery combat, earlier than the enemy, and shall thus soon obtain the superiority in the artillery duel.

Observation of the effect of the newest description of shrapnel has of late rendered many gunners fearful that we shall not be able to come into action at 2,000 metres from the enemy's artillery. Most ingenious and complicated means have therefore been thought out, by which to diminish the effect of the hostile fire and to find cover for the advancing artillery, both during the advance and also as they come into action. For some time there was a preference for positions which were in rear of heights instead of on them, and from which it was proposed to hit the enemy by firing over the hills in front, using subsidiary aiming points, which sometimes lay in rear of the guns. A General in command, seeing this, once naively asked, "Are you shooting through the hill?" I will acknowledge that this complicated plan may be all right in peace; but in the hurly-burly of battle it will come to grief. In order to carry it out observers must be sent out to the front and flank, for the purpose of signalling the results of the first trial shots. Can the artillery commander absolutely depend upon these men? Observation is in truth so difficult, that he will prefer to keep it in his own hands. Will the signals not be misunderstood if other troops march directly across the station of the observers? But the principal objection to such a position is, that we cannot from it fire at the foot of the hills. If the enemy advances to the attack, we cannot from a position of this kind hit the ground at the base of the hills, and cannot therefore assist the other arms of our own army in repulsing the attack. There is even some risk that the enemy's infantry may reach the crest of the heights through this dead angle, and may thus rush in on us from a very short distance without our being able to fire on them. The energetic advocate of the auxiliary aiming point would in such a case move forward to the crest of the heights. But who can assure me that my guns will still be capable of movement? The artillery duel will, in future, cause far larger loss than it formerly did, and it may very well happen that, if many horses are hit, the necessary supply of others may take up so much time, that we shall not be able to make use of the proper moment for taking up a position on the crest of the heights. Practice with auxiliary aiming points is an excellent invention for siege and fortress work, and has been rendered systematic by the use of the new elevating arcs; in these cases it also very much assists the correct service of the guns. But field artillery will be able to employ it with advantage only under very rare and exceptional circumstances. The normal, and in most cases the best, position for field artillery is, and will continue to be, that which affords the best view, that is to say on the crest of the heights. There is, of course, no reason why this crest should not be used to give cover, provided that the guns can look directly over the hill. But they must, especially when on the defensive, be able to hit the foot of the height.

Another scheme for diminishing the effect of the enemy's fire, and one which even gunners with much experience believed in after a time, was to advance the position to the front slope of the hill; the idea being that artillery which stands in front of a background higher than itself is more difficult to see and to hit than if it showed clearly against the horizon. This plan may now and then be correct, when such artillery has some quite special task to carry out. But as a rule a position on the slope which lies towards

the enemy will, when the latter is posted on the hill, be so limited both in the length and the breadth of its field of sight, that it will be distinctly undesirable, and we shall be absolutely obliged to prefer the position on the height in rear, as offering a better view.

Other ingenious people have made their hobby of an unseen creeping-up into position, and have thus thrown away an enormous amount of time before they got to work.

I need hardly say that every intelligent gunner will make use of all such natural cover as the character of the ground may afford, just as an infantry soldier, when he is under fire, seeks for shelter behind trees, undulations of the ground, bushes, walls, and hedges. With this object the guns should, as I have already said, be brought only so far up to the crest of the height as will allow the bore to clear it. Use should be made of everything which may render the target difficult for the enemy. For example, a hedge which stands a few hundred paces in front of the line of artillery may easily deceive the foe. He probably thinks that we are standing close up to this hedge, and therefore ranges himself and expends all his ammunition upon it; I once saw this happen to my great delight. A high wood which stands directly in rear of us may render us completely invisible, if the sun is at such an angle that the shadow of the trees falls upon our line of guns; there are also other similar cases. Artificial cover should certainly be thrown up, even during an action, if there is time to do so. We should also select for choice a line of advance which is covered from the view of the enemy by the lie of the ground, rather than one which is easily visible to him. It would lead me too far if I should here speak of all the possibilities which can be appreciated and made use of, when the character of the ground is correctly known. But we must take care not to search too anxiously for cover, since to do so entails the risk of making our own men sensitive about it, while it makes fear a matter of regulation and takes the edge off their dash. There is no protection from fire equal to killing your enemy as quickly as possible.

It is especially important that we should use the shortest road into position and open fire as quickly as possible, when the moment approaches at which the other arms will push on into decisive action. In this case the artillery which is to advance will be greatly assisted in their movement, if another line of artillery continues to fire from a longer range. If this be carried out the combat will rage along the whole line, and there is more likelihood that the enemy will not pay strict attention to the advancing guns, and will not therefore fire at them. At the Battle of St. Privat single batteries pushed forward straight across the open until they were within 300 paces of the enemy's infantry, whom they surprised with their effective fire. Owing to the present power of field-guns such short ranges will in future be necessary only when the artillery would in all other positions be masked by the other troops of their own force. The range of 1,000 metres will be quite near enough, for the effect of field artillery does not materially increase after this.

The action of field artillery in the attack requires as a rule three positions. From the first fire is opened at long ranges. The advance into the second is made in echelons, whenever it may be desired to bring the artillery fight to a final decision. This second position will be found at a range of about 2,000 metres or a little over. When the enemy's artillery has been overcome, the other arms move on to the attack and the artillery advances, again by echelons, to within about 1,000 metres of the object of attack, with the object of making it impossible for the enemy to direct his fire upon the other arms. When our infantry has got in to 500 metres, and has combined their fire with that of the artillery, this fire will continue for a short time only, until the enemy has been so broken by it that the charge can succeed.

The first of these positions should be carefully selected, and the movement into it should be made under cover, in order wherever possible to surprise the enemy by our appearance in it. In taking up the second position, and yet more in taking up the third, considerations regarding a prompt effect of our fire are of more importance than those relating to cover in front of the battery.

It obviously cannot be my intention to lay down here a system which shall be applicable to all cases. A favourable opportunity, or the nature of the ground, may make it unnecessary, or altogether impossible, to take up three different positions. If, for example, the character of the ground is so favourable, that we can surprise the enemy by moving unseen and at once into a position at a range of 2,200 metres, we ought to omit the first position. If, after having taken up a position at a long range, we find that between it and the enemy there is but one other, and that that is at a range of about 1,400 or 1,500 metres, then the second and third positions will be one and the same. In cavalry actions more especially we shall often take up less than three positions, and sometimes shall use only one, that for final and decisive action.

When acting on the defensive the General in command will indicate that artillery position to which he attributes the greatest value. That arm will arrange for a stout resistance at this point, both by increasing their fire-effect by ascertaining the various ranges, and by diminishing the effect of the enemy's fire by means of the construction of artificial cover. If the main position is anything more than a rear-guard position (in which it is proposed to hold the enemy only for a time, and which it is intended to abandon at some definite moment), and is such that the General is determined to fight a decisive action upon it, the artillery will, in order to lessen the loss, send back their teams into places which afford cover, and should perhaps station their ammunition-wagons (the teams being unhooked) in rear of the guns, either in lieu of or in addition to the limbers. If the enemy can possibly manage it, he will not attack the strong front, but rather a wing or a flank. Again a good defence is inconceivable unless it be combined with a counter-attack. In order to oppose the movements which I have first mentioned, and with the object of emphasizing counter-attacks by the use of artillery, a part of the batteries should be kept ready in reserve with their horses hooked in. At the present day, when the artillery forms an integral part of the army corps, and is no longer a more or less independent technical arm, the General in command will not, even in peace manoeuvres, permit the batteries to leave their position before they have received an order from the commander of the troops to do so. He well knows that the retirement of artillery may far too easily become the signal for a general retreat, and that the infantry can more readily sustain an attack when it is supported by the fire of artillery up to the shortest ranges. The dread of losing guns is no longer a factor in the question. The loss of guns is of itself no disgrace. Some batteries have lost guns and have thus gained the highest honour; and this, perhaps, entirely because they did lose them.

The offensive and the defensive are not always very sharply divided from each other. The last wars have afforded many examples of accidental encounters, in which both sides proposed to attack. Cases have also occurred where neither side had any definite idea of attacking, but where both of them found themselves on the march and thus accidentally came in contact. In such cases only the Officer commanding the troops can lay down where the artillery is to come into action, since their place is at the point where he intends to deploy, that is, to pass from the order of march to the order of battle. The fact that the artillery now forms an integral part of the army corps will in this case have the most advantageous results, since they will

thus be accustomed to carry out in their entirety the orders of the Officer commanding the troops and to enter into his ideas, instead of, as formerly, desiring to be a detached, isolated, and independent arm. In accidental encounters the artillery must, when they first form line, move with the greatest possible rapidity. The nature of such casual engagements is the origin of the fact that in them neither party takes up the attitude of assailant or defender in such a distinct manner as is the case in pre-arranged and well-planned actions. The fight sways more backwards and forwards, and the rôles vary according as the troops which come up into action change the condition of one or the other side. In this case less care need be taken with regard to cover in the artillery positions, and we should strive only to obtain the best possible effect from our fire. Artificial cover should also rarely be thrown up for the guns, but the limbers and teams may be placed behind natural shelter.

III. *Personal Matters.*

It follows, as a necessary consequence of the organization of the field artillery under the Generals commanding Districts, that all personal matters concerning the Officers will from this time forward pass through their hands into those of the highest authorities, instead of, as formerly, passing for the greater part through the Inspectors and the Inspector-General.

Personal matters which affect the Officers include—

- i. Questions connected with military law.
- ii. Questions regarding the laws of honour.
- iii. The selection of Officers as Instructors and for special appointments.
- iv. All estimates and decisions with regard to the general efficiency of Officers, and to their qualifications for promotion.

i. Questions connected with military law have always been in the hands of Generals of Districts.

ii. I have for this reason never been able to understand why questions regarding the laws of honour have, in the case of Officers of the artillery, followed up to the present another path. It is impossible that questions of honour can be judged differently in the case of one arm and in that of the others, even though the former were really differently situated as regarded technical and scientific matters. The fact that all questions arising on this subject were decided by a second authority was certainly not of advantage to the status of the artillery. Such an arrangement was directly calculated to awaken a suspicion that questions affecting honour were less sharply looked after in the artillery, and that scientific proficiency was perhaps held to be of more importance; such a suspicion must injure the status of the arm with respect to the Army in general. This difficulty was further accentuated by conflicts regarding command between the various authorities. The fact that the Generals of Districts were supreme in matters of military law, while the superintendence of interior economy was the duty of the superior Officers of the arm, was already sufficient to produce conflicts respecting command. While the General of the District had to do with courts-martial, the superior Officers of the arm had the control of the keeping of the books, including the defaulter-books. But if, on the occasion of a court-martial, a sentence is laid before the General of a District with the nature of which he finds fault, while the united opinion of the superior Officers of the arm supports it, there must be a conflict of authority, and the junior Officers cannot sometimes be certain as to whose opinion they ought to follow. And such conflicts are even more likely to occur in the case of questions of honour. For even the very best authorities sometimes differ in

opinion as to whether a certain case calls for the decision of a court-martial or of a court of honour. But it is very desirable, in the interests of the discipline of the troops, that all such matters should be governed by one spirit and one principle. I may be told that the wording of the law affords complete and satisfactory guidance in this matter. But troops cannot be governed by the letter of the law. The letter kills. The letter of the law is only of use for the purpose of expressing its correct spirit. True common-sense, and indeed one single spirit and principle, must direct in all these matters. The preservation of discipline and its superintendence (and thus also the management of the defaulter-books) must be an expression of the spirit in which, following the law, the powers of military justice are administered; and one and the same spirit must govern matters connected with both courts-martial and courts of honour. In this respect the infantry and cavalry were formerly better off than the artillery. In the former, the higher administration of justice, the supervision of discipline (including the inspection of defaulter-books), and the decision as to whether a court of honour should or should not be held, were in one and the same hand, in that of the Officer commanding the Division. Connected with this question is the fact that circumstances which become known owing to a judicial inquiry may really thus grow into matters of importance, owing to the expression of the opinion of so many persons.

But formerly such circumstances did not sometimes come at all officially to the knowledge of the superior Officers of the arm, that is to say, to that of the Inspectors and the Inspector-General. For this reason also it is important, in order to obtain a correct opinion as to the Officers, that the power of higher justice, and all matters connected with questions of honour and the estimate of the efficiency of individuals, should be placed in one and the same hand, exactly as is the case with the infantry and cavalry. In this respect also the artillery is now the equal of the other two arms.

iii. Many a gunner will regard the change of organization of the field artillery with apparently well-founded doubt, so far as regards questions which concern the selection of Officers for Artillery Instructorships and for appointments. These are (in addition to the Instructors in Artillery at the War School and the War Academy) the Instructors at the School for Non-commissioned Officers, at the Artillery and Engineer School, those at the School of Gunnery, and the members of the Proof Committee. But these doubts will diminish, if we do not allow ourselves to be deceived by the unfounded belief that artillery must be a specially scientific arm, and if we do not shirk the certain amount of trouble which is necessary in order to get at the "*raison d'être*" of these institutions.

I must first most decidedly deny that the action of artillery requires more scientific knowledge than does that of the infantry. The laws according to which an infantry bullet flies through the air are exactly the same as those which govern the trajectory of an artillery shell. The only difference is that one is larger than the other. The grooves, the twist of rifling, and the shape of the shot are governed by the same principles in all firearms. The charge has in every case a similar effect. Mathematics, physics, and chemistry play exactly the same part in the infantry as in the artillery. But the infantry has never considered it necessary to pose as a specially scientific and peculiar arm. It has indeed done exactly the reverse. As I have already stated above, it had at one time far surpassed the artillery in progress. It was for nearly twenty years universally provided with rifled firearms, while a part of the artillery considered such weapons as impossible, another part held them to be useless, and a third made vain attempts to invent them. In former days, when the artillery themselves cast their guns, there was more to be said than there is now for the idea that extraordinary

technical knowledge was necessary. But since the firearms of the artillery have been constructed in civil manufactories, just as the infantry arms are, the former, like the latter, have had nothing to do but to prove their weapons and use them in battle.

As soon as the artillery had been armed with rifled guns, they felt the need of a school of instruction after the pattern of that of the infantry. When this institution had been got into working order, it soon came to pass that there was no necessity that a good battery Officer of artillery should stay as long as formerly to study at the Artillery School. The first of the three years of study at this institution had already been dropped, since Ensigns of artillery were permitted to join the War School and to pass through the same elementary training as those of the other arms; it was next recognized that the last year of study was also unnecessary in order to make a good battery Officer of artillery. Since then the greater proportion of young Officers of artillery remain only a single year (or rather from nine to ten months) at the above institution. What ought they to learn there? Simply so much as is necessary to enable them to do good work as battery Officers. The best instructors in artillery for them would be Officers selected from the smartest of the senior battery Officers. But these can be perfectly well selected at headquarters, according to the qualification returns of the Generals of Districts, in the same manner as the instructors are selected for the School of Musketry.

My assertion, that a battery Officer of artillery requires no more scientific knowledge than an Officer of infantry, would lead us to the conclusion that a practical Officer of artillery does not in general need to study at any special Artillery School. I do not wish to contradict this conclusion, especially since the School of Gunnery has developed such remarkable efficiency, that an Officer learns there in three or four months more artillery work than he would learn in a year at the Artillery School, and since means are already provided to enable all artillery Officers to visit the School of Gunnery. But I will not enter further into this question, since it is out of place here.

A small number of the students of the Artillery School, particularly such as show special inclination for and interest in science, study at this institution during a second year; they work at the more advanced subjects connected with artillery, such as physics, chemistry, and higher mathematics. Is a special artillery central authority needed in order to select their instructors? Certainly not, since these instructors will be chosen from the leading professors of the University of Berlin.

But what shall we say with regard to the Director of the Artillery School? Every gunner who has in his time visited this institution will agree with me that for this position it is not necessary to have a learned man. The best regimental commander of artillery would certainly be the Director best suited to this institution; and since I have shown that the General of a District is in a position to judge as to the merits of the artillery Officers who are under his command, it is also unnecessary that a central artillery authority should select the Director of this institution. The selection can be made at headquarters, from the reports received from the Generals of Districts, quite as satisfactorily as is that of the Director of War Schools. The principal characteristic which the Director of the Artillery School must possess is a disposition half soldier and half schoolmaster; that is to say, he must be a man of authority, and must know how to manage young Officers, of whom so great a number are gathered together at this institution, that their moral and military training is not so easy as is that of a regiment.

Those Officers who have stayed for a second year at the Artillery School will later on, after they have for awhile returned to practical duty, be qualified for appointment to the Proof Committee or to technical institutions,

according as to which form of science they have especially excelled in during their stay at the Artillery School. The reports of the Artillery School will amply suffice to give all information about them, and there is therefore no need for the existence of an artillery authority to make a selection in accordance with these reports.

With respect to the non-commissioned officers' school, the instructors will rarely require to be of exceptional ability, since all that the students at this institution have to learn is limited to such elementary matters that their instruction can be carried on by any moderately educated Officer. Practical laboratory work alone requires special knowledge on the part of the instructor, and this can be taught by the existing Officers of the laboratory in Berlin, who in the practice of their departmental work have developed a system which is rather mechanical than scientific. But for that very reason their instruction will produce better practical results than if it were given in a learned and theoretical form.

iv. The last and the most delicate of these personal questions is the classification of Officers with regard to their efficiency and their suitability for promotion.

I have already stated at sufficient length, that a General in command, who has to lead all arms in war, must be able also to decide as to the standard of their training in peace. He can, moreover, give an exact and satisfactory opinion as to their Officers, owing to the fact that even in peace he has, at the manœuvres, sufficient opportunity of learning their efficiency in leading their arm in battle. This was not formerly the case. The superior Officer of artillery formed his opinion almost altogether on how he found the troops to have been trained. At the manœuvres, when action in combination with the other arms was represented, the field artillery came under the command of the Corps and Division Commanders. The Inspector of Artillery had not always any opportunity of seeing his subordinates at this their principal work. At any rate he could not interfere, either to blame or to improve, unless he was prepared to create friction with the Commander of the troops. Thus frequently nothing was left to him but to depend upon such communications as the Officer commanding the troops might make to him regarding the conduct of the Officers concerned. But these communications were often very scanty. For the Officer commanding the troops had no special reason to interest himself in the individual value of Officers who were only temporarily under his command. Many also were especially averse to find any fault, since they did not know all about the Officers concerned, and did not like to injure their career for reasons founded on merely cursory observation. Thus the opinion given concerning the working of the field artillery was sometimes rather summary, and consisted only of the statement that they had done everything all right. The Inspector of Artillery could not make much out of this, and the consequence was, that the principal quality of an Officer, namely, his efficiency in the conduct of his command when in action in combination with the other arms, had nothing whatever to do with any decision as to his future. This depended principally upon how he trained his men. But is the best armourer, he who makes the sword, always the best fighter? Only, certainly, in very rare cases.

The General in command, under whom the field artillery will from this time forward remain always placed, will henceforth feel as much interest in one of his Officers of artillery as he feels for one of the infantry or cavalry. He will in the course of the year learn to know his Officers throughout the entire circle of their duty. He will thus be in a position to weigh the different duties against each other, and to attribute to each the amount of value which belongs to it. He may perhaps, for example, prefer an Officer who always brings up his guns quickly to the right spot for supporting the

other arms, even if he here and there gives occasion for blame as regards his elementary exercises, to another Officer, whose battery is a pattern for correctness in drill, but who never brings it up ready into position at the right moment; for the former shows a tactical eye and tactical skill, while the latter knows only how to forge the weapon, and not how to use it.

The General in command, who will henceforward take the same interest in all the three arms, will also endeavour to assist all three as regards their promotion. This was not formerly the case, since the recommendations in the artillery did not pass through his office. It mattered nothing to him if the artillery as regarded their career fell behind the infantry and cavalry. The promotion in the whole of the artillery was, by the action of the superior Officers of the arm, kept nearly at a level, and if the artillery of any army corps had at any time a chance of promotion, this was stopped by transferring Officers to it. In this respect also the new organization will be of advantage to the artillery. This will become most distinctly evident in relation to the promotion to the higher ranks. Such promotion will in future depend upon how far Officers are fit to command Divisions. Whether this be the case or not, the arm will nevertheless get a step by such promotion. This was not formerly the case. It used to be said of many a man that, though he was not fit to command a Division, he might still be capable of doing the duty of his rank with the "technical troops." What the other arms formerly thought of the artillery in this respect I once learnt to my horror, when I heard a distinguished old Officer, speaking in praise of a young artillery General, say as follows: "He is not a mere artillery General, he is a real General."

Some apprehension has been expressed on the part of the infantry and cavalry that, owing to the fact that the artillery has been placed under the Generals of Districts, while the Inspectors and the Inspector-General have been abolished, the infantry and cavalry may be prejudiced with regard to their promotion to the command of Divisions, since the artillery will now have their share of it. In my opinion this apprehension is unfounded, since the command of a Division will not be given to every Officer.

The head of the Army will always select such individuals as are competent to employ all three arms, and will not tie himself down to a certain fixed proportion between the different arms. The number of the men who combine sufficient experience with the necessary physical vigour is moreover not too large. It will do no harm to the Army if the selection be made from a larger number of men, since a more exacting standard can then be laid down, and that is to the advantage of all arms.

An opinion has also been expressed, that the artillery will suffer by the abolition of the Inspector-General, since that arm will now have no authority to represent it in influential quarters. This is a loose way of speaking, which has no particular meaning. Will the infantry and cavalry be represented as a whole? And have these two arms any desire to be represented? How is such a representation to be practically expressed?

I am of opinion that the artillery will in future be better represented by the Generals of Districts than it was formerly by the authorities of the arm, whose claims were frequently very troublesome, since they were half considered as being outside the army. For instance, an Instructor in Tactics once spoke against any increase of the artillery, on the ground that the train of the army would be thus very much enlarged. A General who has entire command of the field artillery will no longer regard them as "train," but as an arm. Let us, for example, take the case that the present peace establishment of the field artillery is obviously not sufficient; an Inspector-General of Artillery would have to lay the necessary proposals before the War Ministry. But the latter would undoubtedly be opposed from the first to any scheme of increase, and would say that the artillery are never contented, and are always

asking too much. The Generals of Districts, under the old organization, would have no interest whatever in putting in a word for the improvement of the establishment. But when once the field artillery has been completely put under the command of these Generals, the latter fully sympathize with any possible failing of the peace organization, and the War Ministry cannot altogether avoid supplying a need, which has simultaneously been considered necessary by all the Generals, and which has been so reported by them.

With regard to the position of the artillery in the eyes of the other arms, and of Officers of high rank, it can be improved only by a closer connection with them, and by a more intimate acquaintance. The field artillery were already in war under the command of the Corps and Division Commanders. The longer the war lasted, the higher was the status of the artillery in the eyes of their comrades of the other arms, especially when they had first had an opportunity of fighting shoulder to shoulder with them, and of enduring together to the end. This became more and more evident the longer the war lasted. Everyone who took part in the last war, which continued during nearly eight months, will certify to this fact.

Of what use then was the former representation of the artillery by a central authority of the arm, as far as concerned its status with the other arms? The ruling principle, which had been laid down from long ago for the guidance of the "technical arm," that artillery must not be exposed to infantry fire, had before long struck in such deep roots, that a very esteemed and highly scientific artillery Officer made the assertion that rifled guns could not be served with the necessary care when the gunners were exposed to the risk of losing their lives. It is therefore not astonishing that one of the foremost authorities of the Army (*nomina sunt odiosa*) said once to me, that the chief reason why there was such a rush for the artillery was, that in this arm a man was not exposed to so heavy an infantry fire, and had thus less chance of being shot. However, the artillery has in the last campaigns quite knocked the bottom out of that idea. It has held its ground, and worked very close up to the infantry, under the very heaviest fire of the enemy's infantry. Then after the battle have we not seen Generals embracing their Battery Commanders, while the privates of the infantry patted the guns which had helped them through so many hours of trouble? However, something still remained of the old prejudice, and it is not long since a very influential person, speaking of a corps of Officers which had especially distinguished itself, said that it was really too good for the artillery.

But nothing of this sort will be any longer possible, when the artillery is a part of the army corps, exactly as are the infantry and the cavalry. Then the same sense of belonging to each other, and the same comradeship, will grow up and gather strength in peace, as first arose after hard fighting in war; and no arm will think itself better than another.

The artillery must certainly have a representative in the higher commands of troops to which it is told off, but it does not need to be represented beyond them. This appears a play upon words, but it is not so. It shows the essence of the matter. Namely, that it is decidedly unnecessary that the artillery should have special high authorities to represent its interests, since those authorities which are now permanently, and as a matter of organization, placed over the artillery will naturally take as much care of the interests of the whole of the artillery which belongs to them as they do of their other subordinates. But these authorities will feel the need of a professional gunner on their Staff, either as an Officer of the General Staff, or as an Aide-de-Camp, in order that he may, when necessary, give information regarding such elementary details or matters of regulation as the General in command, considering his multifarious and extensive duties, cannot possibly keep himself up in. This will be found especially necessary at inspections

and manœuvres. All this sort of thing was even formerly so arranged, in the Divisional and Corps commands, that infantry and cavalry Officers were always to be found on the Staff; so that the General when he inspected infantry was accompanied by an infantry Officer, and by a cavalry Officer when he saw the cavalry. Consideration is taken of this fact also in the new organization, since the Staff of each command is to be increased by the addition of an artillery Officer. With regard to further details, we shall hardly expect to find that, in the working of the office, all questions which concern the artillery will be given over to the artillery Officer on the Staff. For example, in the future, as now, personal matters will be left to one Officer and discharges to another, whether they belong to the infantry, cavalry, or artillery. For the Officers can only lay each question before the General for his decision in continuation of what has gone before, and in accordance with the existing laws, rules, and regulations. If it were otherwise, misunderstandings would arise, especially in personal questions, with regard to which the individual opinions and inclinations of the Staff Officer must be altogether set on one side.

Everything which has been discussed in the foregoing paper with regard to the advantages to the artillery and to the Army, which have resulted from placing the field artillery under the Generals of Districts, might lead us to the conclusion, that it would be still better if the field artillery were in peace told off to the Divisions also, exactly as are the infantry and cavalry. But I will not now enter into this question, since I desire to occupy myself with existing facts only, and have no wish to make propositions of organization for the future. Besides, we do not know whether there may not be an intention to make some day or other a change of organization in this direction, while it may perhaps be now merely postponed, in order to avoid making too great an advance all at once.

THE DRILL REGULATIONS OF THE GERMAN FIELD ARTILLERY.

(25th March, 1889.)

By Lieut.-Colonel WALFORD.

THIS little volume is intended to supersede the previous Regulations of the 23rd August, 1877, and the differences, not only in detail but also in principle, between the two show most plainly the direction in which the progress of the German Field Artillery tends to move. In order to appreciate these differences, it may be well to compare the tables of contents.

Each book is divided into five parts, preceded by an introduction, which in the old Regulations was merely formal, but in the new is so valuable that it is proposed to give a summary of it on a later page.

Part I. *The training without guns.*

i. The training of the individual man. Twelve pages in the old, eight pages in the new book.

ii. The training in squads. A few paragraphs in each.

iii. The battery on foot parade. Sixteen pages in the old, eleven pages in the new book.

iv. The brigade-division on foot parade. Eight pages in the old, a paragraph in the new book.

v. Mounted drill for horse artillery. Thirty-five pages in the old, five pages in the new.

Part II. *Training with unhorsed guns.*

i. Standing gun-drill with a single gun. Thirty-five pages in the old, forty pages in the new book.

ii. Standing gun-drill of a battery. Thirteen pages in the old, nine pages in the new book.

iii. Standing gun-drill in brigade-division. Not mentioned in the old, a paragraph in the new book.

Part III. *Training with horsed guns.*

i. General directions. Eight pages in the old, five in the new book.

ii. Training in driving. Fifty pages in the old, sixteen pages in the new book.

iii. Drill of the battery. Thirty-five pages in the old, twenty-four pages in the new book.

iv. Drill of the brigade-division. Twenty-five pages in the old, nine pages in the new book.

N.B. The drill of the regiment (eight pages of the old book) is now omitted altogether.

Part IV. *The fight.* Twenty-six pages in each book, but of these ten in the old and three in the new are devoted to the renewal of ammunition.

Part V. *The inspection parade.* Twenty-two pages in the old, thirteen in the new book.

If we add to the above that there are in the old book seventy-five plans of various movements and formations, while the new Regulations contain only five, we shall realize how greatly the drill has been simplified. It must, however, be noted that the Practice Regulations, which took up six pages of the old book, are now published in a separate pamphlet of nineteen pages.

It is proposed to examine the various changes in detail under the above heads.

Attention must however be first drawn to two points which, though apparently changes in detail, are in reality alterations of principle ; viz. :—

i. There are no longer any differences between field and horse artillery (or, as the Germans call them, the driving and riding batteries), except as regards the very small amount of mounted drill laid down for the latter, including the minimum of sword exercise, and the variation in distance between lines necessitated by the length of the horse.

ii. The whole of the gun detachment (except the gun-leader, who is mounted) is in a field battery carried on the gun, limber, and wagon. "Detachment rear" is used only as an exception, and no other formation is recognized.

The Introduction.

This lays down that all field exercises must be founded upon what is required in war ; they must therefore be simple, but must be fully mastered. All complicated movements are forbidden.

Every Officer, from battery commander upwards, is responsible for the correct instruction of his troops ; his superiors are to interfere if he is careless or unsuccessful, but his method of instruction is to be such as he may think best.

Gun-drill, or drill without guns, is not to be carried on by any unit larger than a battery. The brigade-division is to practise the systematic combination of several batteries with a common tactical object. The larger units of artillery are not to be worked by words of command.

The exercises are to be varied, and to be adapted to the strength of the men and horses ; otherwise weariness will induce slackness.

The training, beginning on easy ground, is to be continued in difficult country ; and is to be carried on at all times of the year.

Junior Officers must be taught how to command a battery ; for they will have to do so in war.

Accurate practice, at the right moment and from the right position, is the main object of the existence of artillery ; to this end they must master their arm, and keep up a high standard of mobility.

Only such words of command as are contained in the Regulations are to be used. If the words of command, trumpet calls, and signals there laid down are not sufficient, a detailed order must be sent.

PART I.—THE TRAINING WITHOUT GUNS.

i. *The Training of the Individual Man.*

The changes in this section are neither many nor important ; the "closing step" and the "step back" are abolished, and the "sword exercise" is simplified.

Of the latter only three motions remain :

a. Draw swords : in one motion ; the sword brought to the slope. The word of command is now "Das Gewehr-uber !" in place of "Gewehr-auf !"

b. The "Present :" word of command "Präsentirt das-Gewehr !" this is now done in one motion, and is our "Carry ;" it was done in two motions, and was our old infantry "Carry."

c. "Return Swords !" in one motion in place of two.

Officers draw their swords on inspection parades only ; Adjutants do not draw their swords, but salute with the hand. The Officer's salute with drawn swords is similar to our own.

ii. *The Training in Squads.*

This has undergone no important change, and requires no further notice.

iii. *The Battery on Foot Parade.*

The battery falls in, as formerly, in two ranks, but is now sized with the tallest men on the flanks, in place of in the front rank. The battery commander is 15 paces (in place of 20) in front of the centre of the battery, and the trumpeters (3) 10 paces instead of 4 from the right of the front rank. A field battery is formed in three sections (Züge) of which the third is composed of drivers; in horse artillery the battery may be formed in two or three sections. The Officers are told off to the sections by the battery commander. Each section is also divided into small sections (Sektionen) of from four to six files.

The formations are: Line, file, column of small sections, and section column; of these the third corresponds to the old "column of fours," while the last is always at close distance, 7 paces. The movements are limited to: the advance in line, and such as are necessary to change from column to line and *vice versa*, together with a few changes of direction.

iv. *The Brigade-Division on Foot Parade.*

Only to be used at inspection parades, and then to be limited to what is strictly needed in order to get the troops into position.

v. *Mounted Drill for Horse Artillery.*

a. Sword-drill.—This is now limited to: Draw swords; Return swords; Engage; two cuts and two guards, one on the right and one on the left. It is to be first taught to individual men on foot, and is then to be practised mounted at all paces. Three cuts and all points are abolished, as also fixed rules with regard to the conduct of the practice, which is now left entirely to the battery commander. The result is, that the sword exercise now takes up two pages in place of twenty.

b. Movements.—The formations are: Line; column of detachments; file; and the movements are limited to those needed in order to pass from one of those to the other, with in addition the advance in line both direct and diagonal, and the necessary changes of direction. Each movement is to be carried out in one way only, and all wheels in line are abolished.

The charge and all imitation cavalry movements are done away with, riding school details are omitted, and the working of a brigade-division without guns abolished.

PART II.—TRAINING WITH UNHORSED GUNS.

i. *Standing Gun Drill with a Single Gun.*

The gun detachment has been reduced by one number, and now consists of a gun-leader and five numbers. In the horse artillery Nos. 6 and 7 are horse-holders. By the new Regulations the gunners in field batteries are carried, 3, 5, and 4 on the limber, 1 and 2 on the axletree-boxes, but they may mount on either side as may be most convenient; when in "detachment rear" 5, 3, and 4 form the front, and 1 and 2 the rear rank.

"Detachment rear" is to be only exceptionally used, while the "Order of march" is abolished. The posts of the gun numbers when the gun is in action remain the same as in the old Regulations, but the detachment falls in on the gun and not at "detachment rear."

In the horse artillery No. 7 holds the horses of 5, 3, and 4, and stands 4 paces in rear of the limber, 6 holds the horses of 1 and 2, and stands 4 paces in rear of 7; both face the enemy. "Detachment rear" is the only formation for horse artillery detachments.

The gunners with the wagons are carried as with the guns; it is laid down that only three are to come up with each wagon, when the latter moves to the guns in action; in the horse artillery these men are to leave their horses with the 1st Line and come up on the wagon.

A new word "Kanonier" is now used in place of "Artillerist."

At the word "Action" the gun-leader hooks up his sword; the gunners in horse artillery fasten their swords to the saddle; all dismount. There is no change in drill for this, or for "Cease firing!"

"*Action front!*"—The words "im Vorgehen," are used in place of "im Avanciren." The gun-leader's horse is held by the lead driver instead of by the centre driver, as in the old book; the gun-leader selects a position for his gun and places himself in front of it. The other details are as before. For horse artillery directions are given as to how to dismount in such a manner as may facilitate the taking of the horses by the horse-holders.

"*Action rear!*"—If no further word be given the limbers drive on 8 paces, if the word "Action rear!" be followed by "Limbers halt!" the gun is run up the 8 paces into position by hand; if the limbers are to go under cover (which is to be the rule), the guns are run by hand into the position chosen by the gun-leader.

The new Regulations give directions for coming into action to a flank, which were absent from the old book.

"*Front limber up!*"—The only change is the following:—After the gun has been swung round, 4 and 5 are to man the limber-wheels, in order to assist in limbering up. The gun-leader mounts, without waiting for the limbering up to be completed.

"*Rear limber up!*"—The gun is run back to the limber; after which 4 and 5 man the limber wheels as above. Limbering up to a flank calls for no remark. If the limbers, when the battery comes into action, go under cover, they are there formed facing the guns; if they remain in rear of the guns the horses' heads are turned to the rear.

Gun-drill by Word of Command.—The words of command are slightly simplified; they now stand: "Common shell—Right (Left or In front)—target (named) range—load—lay—*n*th gun fire!" For example: Common shell—Right—skirmishers—1,600—load—lay—*n*th gun fire!"

The gun is not sponged out except when firing blank cartridge, and the shell is not at drill entered into the bore, only the motion of loading being made.

If more or less deflection is needed than that constant for the range (for the tangent-scale is vertical) the word of command is "4 more" or "6 less." The deflection leaf is graduated from a zero on the right; thus "less" means right deflection, and "more" left. When once the range, target, and deflection have been given, they are not again mentioned unless it be desired to change one or other of them.

There is hardly any change in the actual drill; but No. 4 now brings up percussion shell unfuzed to the gun-leader, who screws in the percussion-fuze after testing it by shaking: if there be any rattle the fuze is condemned.

The number of the gun, given before the word "Fire!" answers to our "Ready!" When the gun has been fired, No. 2, by the old Regulations, opened the breech, after which the word "run up" was given; both of these are now abolished, the gun being run up without word of command; if it is not to be run up the gun-leader so orders.

Gun-drill without Word of Command.—In this case after the gun has been

fired it is loaded again without any further word of command. Attention is drawn to the necessity of watching that the tangent-scale does not slip down when the gun is fired. A caution is given to No. 2 to take care that, when loading a gun which is limbered up, the steel leaf does not fall out when the breech is opened.

The next paragraph compels us to notice the "Aufsatzplatten;" not that they are new, but because, since we have no equivalent for them, it may be well to describe them. They are small plates of steel, of a peculiar shape, which are placed on the socket of the tangent-scale, fitting round the latter, and which thus diminish the reading on the scale; for example, if the scale be set at 2,100 metres, and an "aufsatzplatte" be placed in position, it will then, read from the upper surface of the "platte," mark about 2,050 metres; if then the scale be run up until it again reads 2,100, it is evident that the individual gun, though nominally laid at 2,100 metres, is really laid at 2,150. Similarly by taking away an "aufsatzplatte" a gun may be made to fire with an elevation less than that used by another, though setting its tangent-scale to the same range. This expedient is intended to make it possible to work guns, which differ in their shooting, by one word of command, and it is customary to use, with common shell, one "aufsatzplatte" at the commencement of the ranging, in order to have a margin in both directions to come and go upon. The "aufsatzplatten" are also used to give a slight increase or decrease of elevation throughout the battery and to make sure that such variation is regular, which would probably not be the case if each No. 2 subdivided the spaces on the tangent-scale by eye. The "aufsatzplatten" are carried by the gun-leader in his fuze-pocket, but are used only when ordered by an Officer.

When firing at a moving target, No. 2, after having laid, calls out "Ready;" but he and No. 3 (who traverses) remain at their posts and follow the movement of the target until it is the turn of the gun to fire; at the word "nth gun" they take post. If the target stops, moves on after stopping, or disappears, No. 2 reports the fact. In the case of a missfire No. 1 (the firing number), if no flame is seen, takes the tube out of the vent; if flame is seen nothing is done until the gun-leader orders.

No. 4 supplies the gun with cartridges (carried in a portable magazine) and shell; No. 5 supplies the gun-leader with fuzes, of which the latter carries generally six.

Fire with Common Shell.—The new word of command is as follows: "Common shell—Right, on the third gun (2 aufsatzplatten) 1,500—4 more." (This last, as before mentioned, means four minutes extra left deflection.)

The use of the quadrant (when the tangent-scale did not give sufficient elevation), of the plumb-line (when the target could not be seen over the sights), and of ranging with the elevating gear alone (when a rapid change was needed), are all given up; their place is in great part taken by the clinometer.

Fire with Shrapnel.—The new word of command is: "Shrapnel—skirmishers in front (1 aufsatzplatte)—1,300."

No. 4 now sets the time-fuze (which is carried fixed); the gun-leader inspects it to see if it is right, corrects it, if necessary, and screws in the detonator. It is necessary to mention that the graduated head of the fuze (which in general pattern resembles our own Time and Percussion fuze) is fixed so tight that it does not move with the rotation of the shell, but is at the same time loose enough to be, with some exertion, turned by hand by No. 4; the gun-leader sets it only when the head, by some accident, is too stiff to be turned without a fuze-key. The time-fuze is carried set to zero, and is at all times set back to this when returned to the limber.

Fire with Case.—The new word of command is as follows: "Case—Right, Cavalry—point blank."

No. 3 alone attends to line ; No. 2 to elevation only ; the latter gives the word "Ready" when firing at a moving target. No. 2 puts in the first case, No. 1 the second, each on his own side. No. 4 remains by the gun-leader until the second case has been loaded—unless he by chance has not a second cartridge in his portable magazine. One round of case was, under the old Regulations, carried on the limber ; both are now in pockets on the trail. At the word "Case !" No. 5 prepares a shrapnel, as, when both the case have been fired, shrapnel with the fuze at zero are to be used ; when these are expended then common shell. No. 4 is responsible that the time-fuze is at zero.

Change of Projectile.—If the shell has not been entered, the fuze (with common shell) is unscrewed by the gun-leader ; a shrapnel fuze is set back to zero, and the shell returned to the limber. If the shell is in the bore the loading is completed.

The words of command are as follows : (i.) "H-a-l-t ! Shrapnel—1,300," or (ii.) "H-a-l-t ! Common shell—right, 4th Battery, 3rd gun—1,600," or (iii.) "H-a-l-t ! Case—left, cavalry—point blank."

Any common shell in the gun is to be fired in the new direction with the correct elevation for that range ; shrapnel are to be fired with special range and in selected direction ; case is to be unloaded.

Change of Target.—The words of command are : "H-a-l-t !—left, battery coming into action—same range," or "H-a-l-t !—right, skirmishers at edge of village—1,400."

Use of the Clinometer.—The clinometer is used—

- (a.) When the tangent-scale is not long enough.
- (b.) When the target cannot be seen over the sights.
- (c.) When the target is hard to see.

It is used as follows :—The gun-leader places the clinometer in its position, allowing for such "aufsatzplatten" as may have been added or taken away. He alone attends to the elevation.

(a.) No. 2 raises the tangent-scale to its extreme height, and gives the necessary deflection ; he then lays for line either over the sights or by an auxiliary point ; the elevation is given by the clinometer.

(b.) No. 2 raises the tangent-scale to the required height, falls back, if necessary as far as the limber, and gets the foresight in line with the target ; he then traverses the backsight into this line ; elevation is again given by the clinometer.

(c.) No. 2 sets the tangent-scale at the required height, and lays for line, either directly or by an auxiliary point ; the gun-leader, as before, gives the elevation by the clinometer.

When No. 2 has laid the gun for line he, in each case, gives the word "Right !" The gun-leader is always to measure with the clinometer the angle between the line of sight and the horizontal ("Geländewinkel"), and is to allow for this when laying with quadrant elevation.

Laying with an Auxiliary Point.—No. 2 is always, when firing at a standing target, to select an auxiliary laying-point, either in front or in rear. The gun-leader and No. 3 are to be informed as to the point chosen. Such a point is used to give line only, elevation being given by the clinometer.

If no suitable point can be found, the laying-pole ("richtlatte") is to be used. This is a pole, about 6 feet in length, painted in alternate feet in black and white ; it is set up either in front or in rear of the gun, and is used as an auxiliary point for laying. The fact that one side of it is planed off to a flat surface, and the manner in which it is painted would lead one to imagine that the horizontal lines so shown might be used for giving elevation, but nothing is said of any such use in the Regulations.

Unloading.—Case only is unloaded ; No. 4 takes the cartridge, No. 2 replaces the case.

Replacing Casualties in Action.—No. 2 becomes gun-leader ; the others are replaced as the gun-leader may please.

Use of the Brakes.—These are put on by order of the gun-leader, by Nos. 1 and 2, who can also work them from the axletree seats when on the move.

Suspension of Fire.—Word of command : “H-a-l-t !—Stand at ease !” All shell are returned and the gun examined. At “Attention !” all take post ; at “Continue the fire” the action is carried on.

Cease Firing.—Word of command : “H-a-l-t !—Battery halt !” All the numbers return stores, and all boxes are locked. Loaded shell are to be dealt with as under “Change of projectile.”

Fire with Blank Cartridge.—No drill shot are to be with the guns ; if there be any, they are to be locked up. No. 3, having no shell to issue, sponges ; care to be taken to keep the sponge clean. There are several minor differences in the drill from that used at practice, but they are unimportant.

Two points remain to be noticed :—

- (i.) Changing round is abolished.
- (ii.) Case is always to be laid point blank, not “over the thumb” as of old.

ii. *Standing Gun Drill of a Battery.*

This section has been so much improved that much of it is practically new ; it is proposed to examine it by paragraphs.

General Principles.

This drill is to be carried on as with a single gun, with the exceptions named hereafter.

Section Officers are to attend to the service of the guns and to see that the targets are understood ; they must also approve of the selection of auxiliary marks. They repeat the range and the “aufsatzplatten,” beginning from the flank where the battery commander stands ; if he is in the centre, then from the right. When it is difficult to hear (*e.g.*, in a high wind) they are to repeat all words of command.

The planting of laying-poles is ordered by the section commander for a single gun, by the battery commander for the battery. This should be done, if possible, before fire commences ; if it has commenced they will be placed alternately (in rear) for each gun of each section.

Ammunition is, as a rule, to be taken from the wagons. The wagon commander will tell off two men to issue shell, the third attending to the portable magazines and fuzes. No. 5 will receive the last, and issue them. It will often be well to bring up the shell to the guns in their boxes ; this will be done by the No. 5 assisted by the wagon numbers.

Telling off the Battery.—The battery is to be told off in sections of two guns from the right ; the guns are also to be numbered. These numbers are to be preserved under all circumstances. All posts in a battery in action are as at single gun-drill, the guns being at 20 paces interval ; but this space is not to be considered invariable.

The battery commander is to stand where he can best observe the battery and the target ; the section commanders between their guns and 10 paces from the points of the trails ; but they are not bound to these spots.

The wagons are to be constantly used at drill in place of the limbers ; they are to stand reversed 30 paces in rear of the right gun of each section.

The Order of Fire.—The fire of common shell and shrapnel is to begin from one flank of the battery, the guns being fired by order of the section commanders in turn from the named flank.

The rate of *ordinary fire* is governed by the necessity for the careful observation of each shell.

If the battery commander wishes himself to note the effect of each individual shell, he gives the command "*Slow fire!*" Each gun will then be fired by command of the section commander when the battery commander gives the word "*Shot!*"

Sectional fire is used only when firing case; each section commander fires his guns without reference to the other sections. The independent fire of individual guns has been abolished.

At the word of command "*Rapid fire!*" all guns which are loaded will be fired as quickly as possible in their turn. If firing common shell they will be reloaded at once; if shrapnel is being used they will wait until the range has been given. After the one round the previous rate of fire will be adhered to.

If the gun whose turn it is to fire is not ready, the section commander calls out "*nth gun falls out!*" The next gun is fired, and the gun which was not ready waits until its turn comes round again.

When the whole battery has fired, the section commander reports "*Fire through!*" this is repeated by the other section commanders in turn.

When firing at a moving target, No. 2 of that gun only whose turn it is to fire gives the word "*Ready!*"

The word of command for a salvo is: "*Salvo!*" or "*2nd and 3rd Sections, Salvo!*" Each section commander, when the guns of his section are ready, reports "*nth Section, ready!*" The word of command of the battery commander is "*Battery, fire!*"

When a salvo has been fired by the whole battery, and it is desired to continue ordinary fire, the battery commander orders "*From right (or left) flank, fire!*" When a salvo of shrapnel has been fired, a fresh shell must not be placed in the gun until the range has been ordered.

Three systems of loading are laid down:—

(i.) Loading through the battery ("*durchgehendes laden*"). Each gun is run up and loaded immediately after firing.

(ii.) Sectional loading ("*zugweises laden*"). At the word of command "*By sections, nth Section, 1,800,*" only the guns of the named section will be made ready and fired. The others will be laid and their breeches opened, No. 4 being ready to set the fuze, and the gun-leader to put in the detonator. This plan will be used with shrapnel.

(iii.) Loading by rounds. ("*Lagenweises laden.*")

N.B. "*Lage*" means one round through the battery.

One round per gun will be loaded and made ready at the word of command "*By rounds—1,800.*" The next round will be governed by the word "*Next round—1,900.*" The latter word of command may be given before the first round is finished, in which case the guns which have not fired keep to the range first given. After firing, the guns will be worked as in the case of sectional loading. All loaded guns must be fired before commencing "*loading by rounds.*"

In order to change from (ii) or (iii) to (i) the word of command is "*Load through!*"

If, when using "*ordinary fire*" it is desired to increase or diminish the rate, the battery commander orders "*Shorter (or longer) fire intervals.*"

Section commanders observe the fall, right or left, of every shot of their guns, except in "*rapid firing,*" "*sectional firing,*" or a salvo. If the battery commander wishes for information on this point, he asks "*Line?*" the section commander concerned answers "*Right!*" "*4 left*" or "*Doubtful!*"

The Distribution of Fire.—If the whole width of the target is to be brought under fire, the order is given "*Distribute the fire!*" The section commanders then tell off each gun to a part of the target.

When firing case, the laying numbers choose their own part of the target. Each gun, as a rule, is to fire at that portion which is opposite to it, but when firing shrapnel or case, no gun must be laid too near the flanks.

If the battery commander wishes to give any special direction to the fire, he orders "Lay on the three guns on the right!"

Opening Fire.—The words of command are as at standing gun-drill of a single gun.

If the clinometer be needed by the whole battery, the battery commander orders its use. When the range is greater than that marked on the tangent-scale, the section commander takes the deflection from the range table. He also corrects, if necessary, the deflection laid down for any particular range.

When the target is stationary, the angle between the line of sight and the horizontal is to be measured by all the guns; this is to be done at the first round, if possible, and at the latest when the battery is ranged; but this operation is not to interfere with the fire. If the target is at very varying heights it may be necessary to repeatedly measure this angle after the fire has been distributed.

Change of Projectile.—The words of command are as before.

When the projectile has been changed, or the length of the fuze altered, the section commander of the gun which first takes up the change must, before firing, report "Common shell," "Shrapnel," or "New fuze."

If a gun has lost its turn before or after a change of projectile, the section commander reports "Shrapnel," "Common shell," or "Old fuze!" This order is provided to prevent mistakes in observation.

Change of Target.—(i.) When the same projectile is retained. The words of command will be as follows: "H-a-l-t!—Right, on the battery unlimbering—same range;" or, if the range be changed, "H-a-l-t!—Left, Cavalry—1,600." If the guns be loaded with shrapnel, then: "Rapid fire!" after which "Right, the Battery—1,800."

(ii.) When the projectile is changed. The words of command are as follows: "H-a-l-t!—Case—Right, skirmishers—point blank." Or when changing from shrapnel to common, "H-a-l-t—Common shell—Rapid fire!" When this is finished, then "Right, skirmishers in shelter-trenches—1,400." The guns which were loaded with shrapnel are fired at the old target, the common shell at the new. This plan is also to be followed when a change is made to a considerably longer range.

If the word be "H-a-l-t!—Common shell—directly against the infantry advancing from the village—1,100," the battery will turn immediately on to the new target.

Movements with Unlimbered Guns.—Changes of front.

(a.) Word of command: "Change front on the *n*th gun!" The gun named is thrown round to the new front, the others are run up or back by hand, the gun-leaders placing themselves in the new position, and serving as points. The limbers and wagons are, when possible, to conform.

(b.) Word of command: "*n*th Section, right (or left) wheel—march!" The flank gun is thrown round to the new flank and loaded; the next moves up by the shortest way with 5 paces interval.

(c.) Word of command: "Battery in action, about—march!" The guns reverse; the led horses and carriages clear the front.

iii. *Standing Gun Drill in Brigade-Division.*

This is rather, to speak correctly, training in the conduct of fire of the brigade-division, for it is to be carried out on tactical lines with some distinct problem for its central idea, and it is specially ordered that it is to be worked on the system laid down in Part IV, The Fight. Every drill is to be followed by a lecture

PART III.—TRAINING WITH HORSED GUNS.

i. *The Course of Training.*

It is laid down that the course of training is to begin with instruction in driving ; this is to be followed by the practice of all the regulation movements and formations on level ground, after which the battery is to be worked in difficult ground and on some tactical plan.

The order of the guns may be inverted ; the main point is that the battery shall form line rapidly to either flank.

Especial importance is to be attributed to—

(a.) A long quiet trot in battery column over all kinds of ground.

(b.) Rapid forming line.

(c.) A quick appreciation of the different points of direction for the march in open battery.

(d.) Skilful limbering up and unlimbering.

Passing over the definitions of various expressions and also the list of intervals and distances, which will be referred to on a later page, it is however worth while to notice the following signals, which may be made with either the sword or the arm :—

“ Follow me ! ”—Arm high, pointing out the direction to be taken.

“ Halt ! ”—Let the arm fall.

“ Increase to next pace ! ”—Swing the arm over the head.

“ Diminish the pace ! ”—Arm held out horizontally.

The details of the various paces remain as in the old Regulations, but the limitations therein contained as to the use of the gallop by field batteries are struck out.

Another change which has been made is with regard to the “ dressing ; ” by the old Regulations the battery always dressed by the right ; by the new it, when in line, dresses by the commander of the second section from the right, unless a special order be given to dress by a flank.

By the new Regulations the system of wheeling has been somewhat changed ; the outer flank is no longer to increase its pace, but is to move at that previously ordered, while the inner flank is to lessen its pace ; again, when forming line, the outer gun is to move at the former pace, provided that it be not less than a trot.

ii. *Instruction in Driving.*

This, which formerly filled an Appendix of fifty pages, is now placed in its proper position, and is at the same time considerably shortened by the omission of the whole of what may be called the “ riding school ” part of the training. A mass of details of no practical use, but requiring an enormous amount of time for their acquirement, and including thirty-seven out of fifty-nine paragraphs, have been abolished, while the others have been at once improved and cut down.

The course as now arranged is very practical, and includes driving over all descriptions of ground—soft, hilly, and wooded, and a certain amount of jumping.

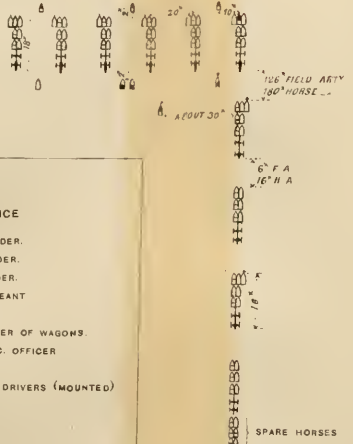
No system of equitation is laid down in either book, but instruction in this is probably (as formerly) carried on in accordance with the Cavalry Drill-book.

iii. *Drill of the Battery.*

A battery at war strength consists, as before, of 6 guns, 8 ammunition-wagons, 3 store wagons, a field-forge, and the Officers' and spare horses.

It is divided into—

FIG 1 _OPEN BATTERY._
FIELD ARTILLERY



REFERENCE

- BATTERY LEADER.
- SECTION LEADER.
- WAGON LEADER.
- QR.-MR. SERGEANT
- GUN LEADER.
- SECTION LEADER OF WAGONS.
- SERREFILE N.O. OFFICER
- TRUMPETER.
- GUNNERS AND DRIVERS (MOUNTED)
- PAGES.

FIG. 2 _CLOSE BATTERY._
HORSE ARTILLERY

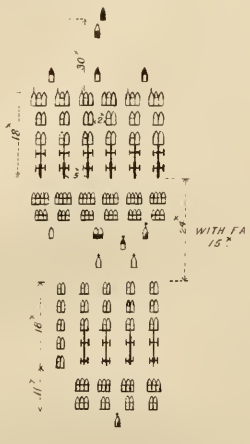


FIG 3 _BATTERY COLUMN._
FIELD ARTILLERY.



FIG 4 _SECTION COLUMN._
FIELD ARTILLERY



FIG. 5 _BRIGADE DIVISION IN LINE.

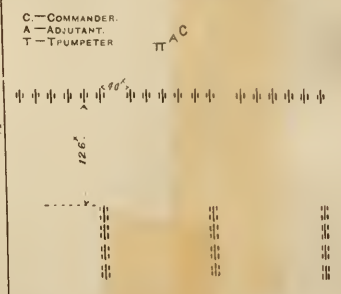


FIG 6. _DEEP COLUMN.

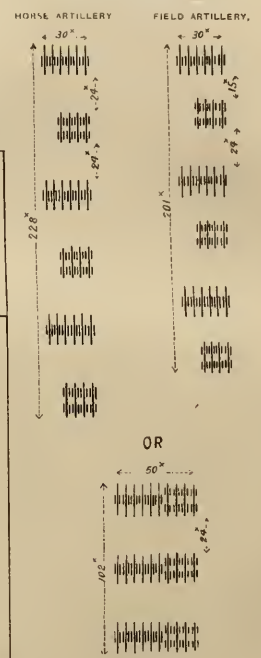


FIG. 7. _BROAD COLUMN._

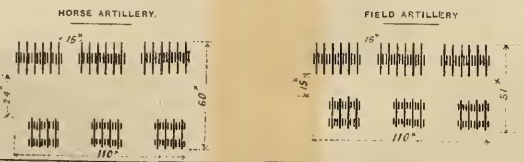


FIG. 8. _BRIGADE DIVISION COLUMN._

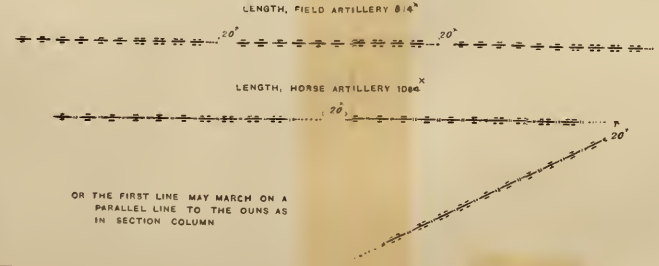


FIG 9. _BRIGADE DIVISION IN SECTION COLUMN._

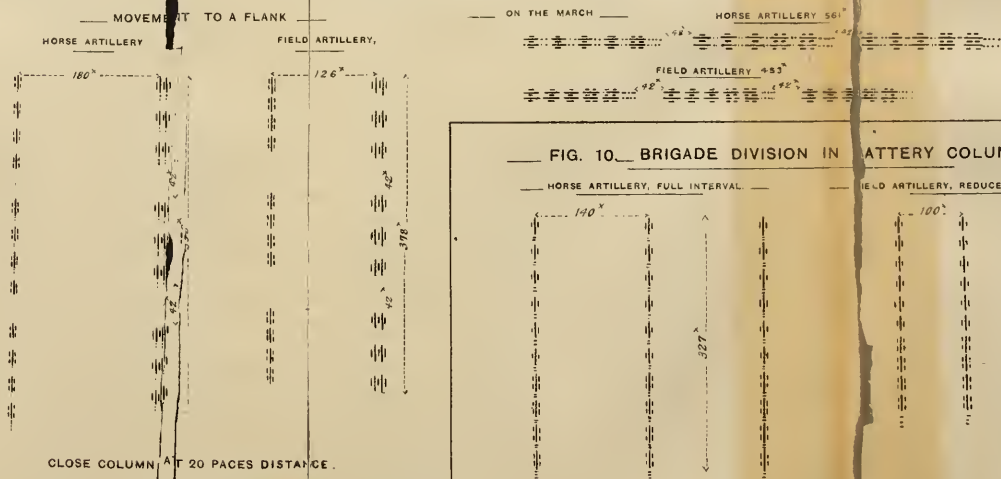
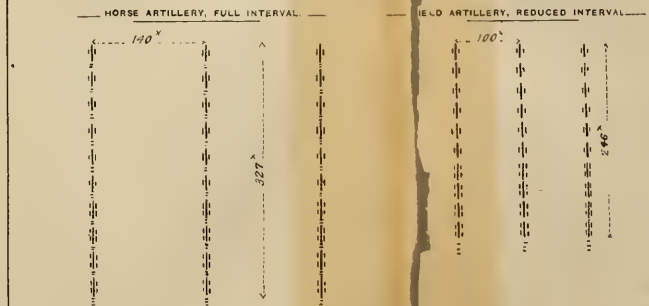
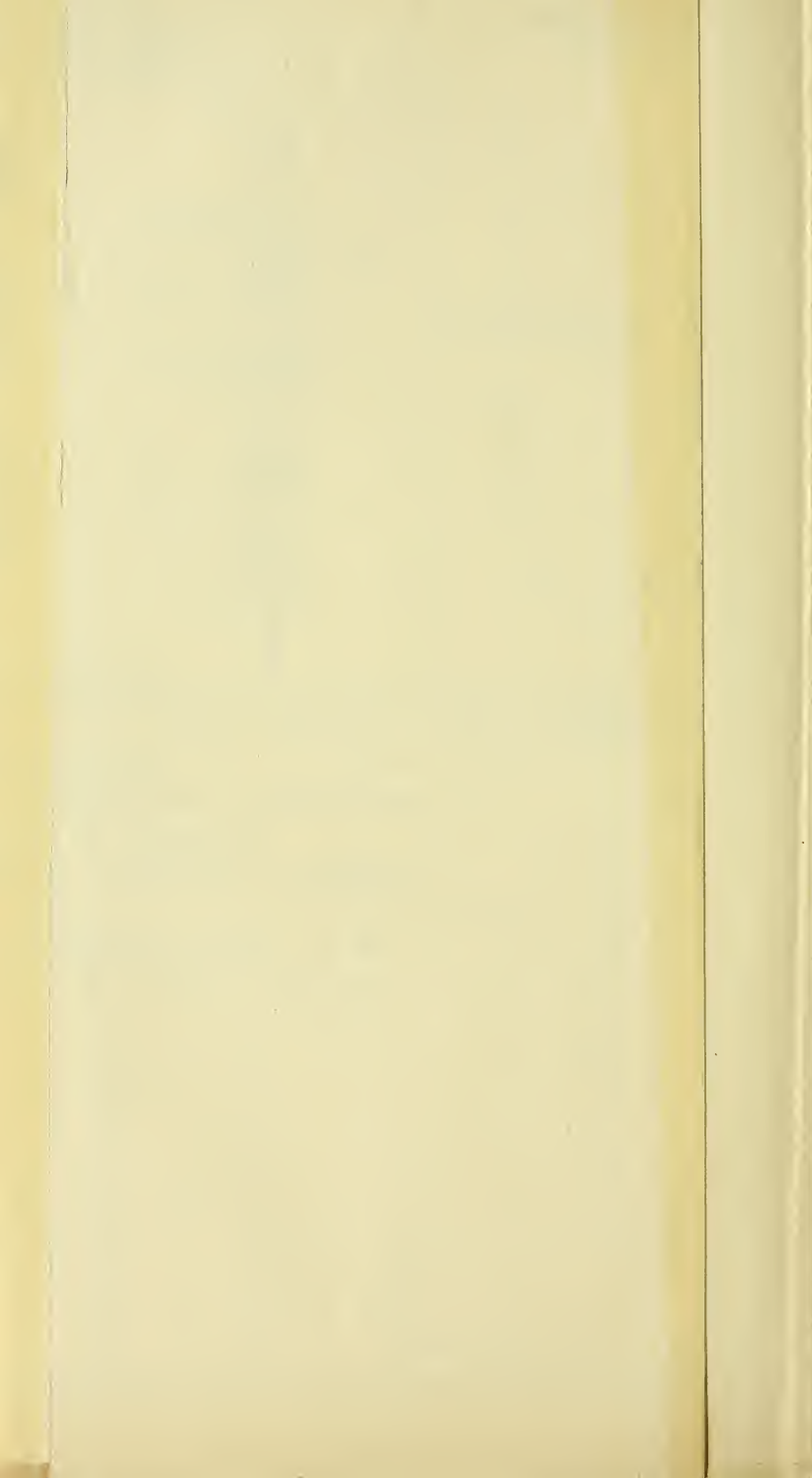


FIG. 10. _BRIGADE DIVISION IN BATTERY COLUMNS._





(a.) The "fighting battery," which consists of the six guns and the 1st Line, including three ammunition-wagons, one store-wagon, and the Officers' horses.

(b.) The 2nd Line, including the remaining wagons and the spare horses.

The new Regulations are drawn up for a battery at war strength, whereas the old book was arranged for a peace battery of four guns and no wagons.

The Formations.—Of the former six formations four are retained, with such changes as the addition of the 1st Line necessitates; but the names of those four are altered.

Taking them in order—

(a.) The "battery in line at full interval" has become the "open battery."

This (Fig. 1) is intended to be used for advancing and retiring within the zone of the enemy's fire. It is formed as shown in the accompanying diagram; the column of wagons may cover either flank. It will be observed that the gun-leaders, who used to march on the off-side of the off-leader, have now changed sides, and that the positions in column of the section leaders, both of guns and wagons, have also been altered.

(b.) The "battery in line at close interval" is now the "close battery."

This formation (Fig. 2) is to be used for assembly, for parking, and for parade work. In the two first cases the 1st Line may also be in line on either flank of the guns.

(c.) The "column on one" (field column of route) is now the "battery column." It (Fig. 3) is employed for the advance or retirement or for flank movements within the zone of the fire of the enemy, as a column of march, and as an assembly formation when the troops fall in on a road.

(d.) The "open column of sections" has been abolished.

(e.) The "close column of sections" is now called the "section column."

The section column (Fig. 4) serves for flank movements (as a rule outside of the range of the enemy's fire) as a column of march, and as an assembly formation on broad roads. In the two last cases the 1st Line will follow the guns in column of sections, all distances being closed to 6 paces with field and 15 with horse artillery.

We thus find that the open battery and the battery column are alone to be used on the field of battle, while there are two orders of march available, according to the width of the road.

Passing over the succeeding paragraphs, which deal with the posts of the Officers, &c. (which are shown in the diagrams), dressing, mounting and dismounting, and honours, we come to—

The Movements of the Battery.—These have been reduced from forty-nine to twenty-four, and include the following:—

(a.) Advance of the open or close battery.

(b.) Retirement of the open battery.

(c.) Diagonal march of the open or close battery.

(d.) To diminish the intervals.

(e.) To increase the intervals.

(f.) The wheel of a close battery (to the right, left, or about).

(g.) Change of direction in open or close battery.

(h.) Open battery to battery column --

(i.) To a flank. By taking ground.

(ii.) To the front. By advance of flank gun.

(i.) Close battery to battery column (by advance of flank gun).

(j.) Open battery to section column (by the wheel of sections to a flank).

(k.) Close battery to section column (by the advance of a flank section).

(l.) From section column to battery column (by the advance of flank gun).

(m.) From battery column to section column (rear guns of sections form on leading guns).

- (n.) Increasing or diminishing intervals in section column.
- (o.) Advance of the battery or section column.
- (p.) Retirement of ditto, ditto.
- (q.) Diagonal march of ditto, ditto.
- (r.) March of ditto, ditto to a flank (by taking ground). This is only to be used for a short distance.
- (s.) Changes of direction of ditto, ditto.
- (t.) Battery column to open battery—
 - (i.) To a flank. By taking ground.
 - (ii.) To the front. By forming line.
- (u.) Section column to open or closed battery—
 - (i.) To a flank. By the wheel of sections.
 - (ii.) To the front. By forming line.

A. Action front and rear.

B. Cease firing and limber up.

Of the above it will be necessary only to notice the two last.

A. The battery commander is to precede the battery, which the next senior brings up. The former places himself where he pleases, and may either dismount or remain mounted. The section commanders pass between their limbers, dismount, and give their horses to the nearest wheel-driver. If a section commander cannot see the target when he is on foot he mounts again. If the limbers stay by the guns the battery commander, as a rule, allows the drivers and horse-holders to dismount. If the order "Limbers under cover" is given, the quartermaster-sergeant takes the limbers under cover at a walk, the led horses leading.

At the word "Action!" the three wagons of the 1st Line advance to the battery and, unless otherwise ordered, reverse one in rear of the right gun of each section. (In peace manœuvres, when no wagons are present, they are to be represented by shell-boxes.) A wagon leader takes command of these wagons. If there are less than three wagons available the battery commander decides as to their position.

At the word "Limbers under cover" the wagon leader gives the order to unhook, and the teams follow the limbers at a walk.

The senior present takes command of the 1st Line and of the limbers; the renewal of ammunition is the duty of the commander of the 1st Line. He, or the commander of the limbers, places the limbers, teams, and the remainder of the 1st Line under cover as the battery commander shall direct. Their front will be towards the battery, and the mounted men will dismount, except the commander of the 1st Line and the quartermaster-sergeant.

When coming into action to a flank the guns will first open or close to an interval given by the battery commander; if this interval is less than the length of the team, the leading and centre drivers incline to the side away from the enemy; in the horse artillery the detachments form up on that flank also, in line with the wheel-drivers. The 1st Line moves by the shortest road.

B. If the limbers are under cover the battery commander brings them out before ceasing fire, and sends them word at the same time whether he proposes to advance, retire, or move to a flank. The wagon teams, unless otherwise ordered, come up with the limbers and hook in. If the limbers are in rear of the guns the drivers and horse-holders mount at the word "Battery, halt!"

iv. *Drill of the Brigade-Division.*

The Formations.—Of these there is now the same number as in the old Regulations (6), but they are so changed, both in name and character, that any comparison is impossible. The new formations are—

- (a.) *Line* (Fig. 5).—This is a line of open batteries at 40 paces interval

(the old interval was 20 paces), which space may, however, be diminished or increased.

(b.) *Deep Column* (Fig. 6).—Is a column of close batteries at 15 paces distance in field and 25 in horse artillery; these batteries may have their 1st Line either in rear of, or in line with, the guns. It is to be used only for assembly when space is limited, and for inspection parade purposes.

(c.) *Broad Column* (Fig. 7).—Is a line of close batteries with 15 paces interval. It is employed for assembly, for parking, and for inspection parade purposes.

(d.) *Brigade-Division Column* (Fig. 8).—Is a column of batteries in battery column, with 20 paces distance. It is to be used in the same manner and for the same purposes as the battery column.

(e.) *Brigade-Division in Section Column* (Fig. 9).—Consists of a column of batteries in section column, with 42 paces distance; but this distance will vary with the interval taken between the batteries in line. When at close distance the batteries close to 20 paces. It is to be used for the same purpose and in the same manner as the section column of a single battery.

(f.) *Brigade-Division in Battery Columns* (Fig. 10).—Is a line of battery columns with from 100 to 140 paces interval. The intervals may be varied, except when about to form line, and they need not be equal to each other. This formation is that ordinarily used on the field of battle for movements to the front or rear.

It is hardly necessary to enter into the details as to the position of Officers, but it must be mentioned that the brigade-division commander, with his staff, may place himself at any point where his presence appears desirable, while the battery commanders are at liberty to quit their posts temporarily, if necessary.

The Movements of the Brigade-Division.—Under the old Regulations these were fifty-five in number; they are now twenty-one, as follows:—

- (a.) Advance in line.
- (b.) Retire in line.
- (c.) Diagonal march in line.
- (d.) Change of direction in line. (The Commander points out the new direction to the battery of direction; the others conform.)
- (e.) From line to brigade-division column (by taking ground).
- (f.) From line to brigade-division in section column (by the wheel of sections).
- (g.) From line to brigade-division in battery columns (by advance of flank guns).
- (h.) From brigade-division in battery columns to brigade-division column (by the wheel of the heads of batteries, or by the advance of a flank battery and two wheels of the others).

The 1st Lines, unless otherwise ordered, directly follow their guns.

- (j.) From brigade-division column to brigade-division in battery columns.
- (i.) To the front. The leading battery advances at a walk; the others come into line with it at a named pace. If, while the movement is going on, the leading battery changes direction, the others conform.
- (ii.) To a flank. By a wheel of the heads of batteries, taking up the interval on the move.
- (k.) From brigade-division column to brigade-division in section column. (As in the battery, the rear batteries closing up.)
- (l.) Increasing or diminishing intervals in brigade-division in section column.
- (m.) From brigade-division in section column to brigade-division column. (Advance of flank guns.)

(n.) From brigade-division column and from brigade-division in section column to deep or broad column.

These movements are carried out by the batteries independently.

(o.) Changes of direction when in brigade-division column or in brigade-division in section column. (By taking ground or wheeling.)

(p.) Change of direction by the brigade-division in battery columns. (Battery of direction changes direction, the others conform.)

(q.) From brigade-division in battery columns to line. (By the wheel of the heads of batteries.)

(r.) From brigade-division column to line—

(i.) To the front. By forming line; each battery moves independently.

(ii.) To a flank. By the wheel of the heads of batteries, followed by forming line. The intervals to be gained during the further advance.

(s.) From brigade-division in section column to line—

(i.) To a flank. By the wheel of the heads of batteries, followed by forming line.

(ii.) To the front. By forming line to the front, carried out by the batteries independently.

Action.—Carried out by batteries, the battery commander deciding as to how he shall come into action.

Cease Firing and Limber up.—The brigade-division commander orders whether his force is to advance, retire, or move to a flank. He then sounds the call "Cease firing." The batteries limber up independently, and the manner of limbering up is left to the battery commanders.

PART IV.—THE FIGHT.

This chapter is so important that none of it can well be omitted, while it is also so concise that it cannot be condensed; since, owing to want of space, it cannot now be given in its entirety, it has been thought better to postpone all mention of it.¹

PART V.—THE INSPECTION PARADE.

Of this it will be sufficient to notice two parts: the parade without guns and the parade with guns.

i. *The Parade without Guns.*

A battery parades in line, a brigade-division or larger body in broad column, of which the batteries are formed in section column with 3 paces interval.

A battery marches past in line or in section column; a larger force in column of batteries or in section column.

ii. *The Parade with Guns.*

A battery parades in close battery; a brigade-division in broad column, if the available space will permit; if it will not, then in deep column.

All units march past on the front of a battery, or in section column.

The march past may be at a walk, a trot, or a gallop.

Detailed comment on the new Regulations would be superfluous, even if space would permit of it; the simplicity and conciseness of the whole book

¹ A translation of the whole part will appear in the next number of the R.U.S.I. Journal.

are marvellous, while at the same time it is impossible to point to the omission of any single point which would or could be of importance in war. It is desirable, however, to draw attention to the following :—

(i.) The only portion of the book which has been increased in length is the "Standing gun-drill with a single gun." In this section alone is the freedom which is given to the battery commander in all other matters confined by rigid rules and orders.

(ii.) There is no provision for any change of front by a battery or brigade-division in line, save such as may be carried out when the guns are in action by running the several guns up or back by hand.

(iii.) All movements of the brigade-division which necessitate anything beyond a simple wheel are carried out independently by batteries.

(iv.) There is a marked tendency, almost amounting to the expression of a principle, to work both batteries and brigade-divisions "on the move," in place of "at the halt."

NOTICES OF BOOKS.

The Queen of Naples and Lord Nelson. By J. JEAFFRESON. Two vols. London: Hurst and Blackett, 1889. Pp. 734. Size $7\frac{3}{4}'' \times 5\frac{1}{2}'' \times 2\frac{3}{4}''$. Weight under 2 lbs. 12 ozs. Price 21s.

The author has set himself to clear the character of Maria Caroline, Queen of Naples, and has devoted great labour and research to this purpose. We give Mr. Jeaffreson the fullest credit for the best intentions in the line of literature he is following, but we must honestly express our belief that the educated Englishman of the present day no longer judges the morality of the past by the standard of the present, and the detailed examination of the relations between public personages long since passed away is a matter not only of little interest, but one in which he may fairly be excused taking part. We own we are very tired of Emma Hamilton, who reappears in all her notoriety in these pages.

Life of Frederick Marryat. By DAVID HANNAY. London: Walter Scott, 1889. Pp. 159. Size $7'' \times 5'' \times \frac{3}{4}''$. Weight under 10 ozs. Price 2s. 6d.

Oh! Professor Robertson, who edits this series of *Great Writers*, why Life of Frederick Marryat? Why not call him by the name we all know him by, "Captain Marryat," in the days of our boyhood? Why not let us in our maturer years know you are telling us about our old friend? We should at once write to your publisher to learn all about one who gave us as much, if not more enjoyment, than did even the publisher's great namesake. However, we will make good so far as we can your little mistake, by telling old sailors and old soldiers that here is the story of the life of one who charmed us with *Peter Simple*, *Poor Jack*, and above all dear old brave *Masterman Ready*.

A Dictionary of Explosives. By Major J. P. CUNDILL, R.A. Chatham: Mackay and Co., 1889. Pp. 109. Size $8\frac{3}{4}'' \times 5\frac{3}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. 2 ozs. Price 4s. 2s. at R.E. Institute to Officers and non-commissioned officers R.A.

This very useful book comes from the S.M.E., Chatham, and is based on a course of lectures delivered at the School by Major Cundill.

Henry the Fifth. By the Rev. A. J. CHURCH. London: Macmillan, 1889. Pp. 155. Size $7\frac{3}{4}'' \times 5\frac{3}{4}'' \times \frac{3}{4}''$. Weight under 12 ozs. Price 2s. 6d.

David Livingstone. By THOMAS HUGHES. London: Macmillan, 1889. Pp. 208. Size $7\frac{3}{4}'' \times 5\frac{3}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

Lord Lawrence. By Sir RICHARD TEMPLE. London: Macmillan, 1889. Pp. 203. Size $7\frac{3}{4}'' \times 5\frac{3}{4}'' \times \frac{3}{4}''$. Weight under 12 ozs. Price 2s. 6d.

Men of Action Series.

We have not the slightest wish to chant the praises of "our noble selves," for we have a firm belief that Englishmen are what they are because Nature made them so. But the appearance of these three biographies almost simultaneously does bring home to one the fact that of all Europeans it is the Englishman who shows his superiority over others as a "man of action," regardless of time or place. This is the sort of literature which should form a part of the mental pabulum of the rising generation in our schools in its efforts to master English history, for it is men like Henry the Fifth, Livingstone, and Lawrence who made it.

Autobiography of Giuseppe Garibaldi. Authorized translation. By A. WEMER, with a Supplement by J. W. MARIO. 3 vols. London: Walter Smith and Innes. Pp. 1080. Size $8\frac{1}{2}'' \times 5\frac{3}{4}'' \times 4\frac{1}{2}''$. Weight under $5\frac{1}{4}$ lbs. Price 31s. 6d.

This is a very valuable work, throwing light on modern European history.

Four Famous Soldiers. By T. R. E. HOLMES. London: Allen, 1889. Pp. 344. Size $7\frac{3}{4}'' \times 5\frac{1}{2}'' \times 1\frac{1}{2}''$. Weight under $1\frac{1}{2}$ lbs. Price 6s.

"It never rains but it pours" seems applicable to biographical works to-day. Sir Charles Napier, Sir William Napier, Sir Herbert Edwards, and Hodson of Hodson's Horse are the figures portrayed by Mr. Holmes. In future editions the biography of the last-named of the quartette might, with advantage, be omitted. It seems to us little short of cruelty to put side by side with the biographies of three men, each of whom the author seems to regard as a type of excellence in his own way, that of a man of whom he has so low an opinion as he has of Hodson of Hodson's Horse; and which he expresses in such outspoken language. The contrast is almost painful to the readers.

Submarine Mines and Torpedoes as applied to Harbour Defence. By J. T. BUCKNILL, late Major R.E. London: Office of "Engineering," 1889. Pp. 250. Size $10'' \times 6\frac{1}{2}'' \times 1''$. Weight under 1 lb. 10 ozs. Price 12s. 6d.

The great practical experience of Major Bucknill in Submarine Mines and Torpedoes renders this book of great value.

Les Iles Samoa ou des Navigateurs. Le Conflit entre les États-Unis et l'Allemagne et la Nouvelle Conférence de Berlin. Paris: C. Bayle, 1889. Pamp. Pp. 40. Price 1 fr. 25 c.

Catechism of the Manual of Instruction of Army Signalling. By Major L. EDYE and Captain RHODES, D.S.O. Chatham: Gale and Polden. Pp. 156. Size $7\frac{1}{2}'' \times 5\frac{1}{4}'' \times \frac{1}{2}''$. Weight under 10 ozs. Price 2s. 6d.; post free to any part of the world.

Guides' and Markers' Duties and Company Drill. By WILLIAM GORDON. 5th Edition. Chatham: Gale and Polden. 1s.; in paper covers 9d. each; or 7s. 6d. per dozen, post free.

The undermentioned books have been received and will be noticed in the October number of the Journal:—

Torpedoes and Torpedo Warfare. 2nd Edition. By C. SLEEMAN. Griffin and Co.

Life of C. B. Vignoles, Soldier and Civil Engineer. By O. J. VIGNOLES. Longmans, Green, and Co.

Prospectus and Plan of Elson's Maritime Code of Signals. S. R. ELSON, 71, Drummond Harbour, Calcutta.

Embarkation and Disembarkation of Troops. By Colonel FURSE, C.B., A.A.G., Portsmouth.

History of the XXth Regiment, 1688-1888. By Lieutenant B. SMYTH. Simpkin, Marshall, and Co.

Battles and Leaders of the Civil War. 4 vols. 4to. T. Fisher Unwin.

The Army and Navy Calendar, 1889-90. W. H. Allen and Co.

Words on Wellington. By Sir W. FRASER. J. C. Nimmo.

Cold Steel. By Captain A. HUTTON. Clowes and Sons.

The Journal
OF THE
Royal United Service Institution.

VOL. XXXIII.

1889.

No. 150.

Wednesday, May 29, 1889.

LIEUT.-GENERAL HENRY BRACKENBURY, C.B., R.A., Director
of Military Intelligence, in the Chair.

THE TACTICS OF COAST DEFENCE.

By Lieutenant-Colonel WALFORD, h.p., R.A.

“THE tactics of coast defence” have, I believe, never been brought forward in any distinct form, and I have failed until recently to find any works on the subject either in our own or in foreign languages. I hope, however, to be able to convince you, not only that this study is the natural outcome of our continued advance in matériel and in training, but also that it is well worthy of careful investigation, since on an intelligent comprehension of its principles will depend the construction and handling of the various works and engines of defence which we are, at great cost, accumulating in all parts of the world.

It is universally acknowledged that field tactics form an integral portion of the art of war, teaching as they do the system of the employment of men and weapons in actual battle; the tactics of siege operations are also, by common consent, allowed to be worthy of study; why then should any one deny that coast defence, which also has its peculiar form of combat, should alone be incapable of inspiring a peculiar system of tactics. This denial is based, I believe, on two causes.

i. A conviction that tactics imply movement.

ii. The fact that coast tactics require for their comprehension some knowledge of another branch of our forces, viz., of the Navy.

If we examine these in turn we shall, I believe, find that we have merely denied that which we do not rightly understand, and have indeed attempted to blind our eyes to the necessity of knowledge by strenuously asserting that no such knowledge exists.

i. *The Conviction that Tactics imply Movement.*

This conviction (which in some of us may, I hope, be rather styled an impression) has sprung from the narrow limitation which it has been customary to set to the meaning of the word "Tactics." Field tactics, as I said just now, have in these days a distinct meaning in the minds of the majority of soldiers, but it is not very long since some of us regarded them as "theory" (a word which always tends to most please those who least grasp its meaning), and condemned them on the ground that they were unpractical in the field; this school is, let us hope, moribund if not extinct; it has been killed by the very god it served, practical experience in war. Others again have confused tactics with drill, the end with the means, or rather with only one of the means, since discipline and organization have an important share in rendering tactics possible.

A considerable number among us still regard "the tactics of coast defence" as being a contradiction in terms, owing to the fact that no movement of troops is possible under the conditions of the defensive action of forts. These pass over, I think, the fact that the essence of pure defence in the field is also immobility, and in saying this I do not forget the absolute necessity of the after-action of the counter-attack. The counter-attack is undoubtedly impossible in coast defence, of which the character must be purely passive. But since we acknowledge the existence of a system of tactics in passive defence in the field, why is such a system impossible in passive defence on the coast?

If we look a little deeper into the matter we shall, I think, be inclined to agree that the word "Tactics" expresses the working of armed troops under fire, whether they be halted or on the move.

ii. *The fact that "Coast Tactics" is not entirely a Military Question.*

By the nature of their respective services the Army and the Navy have little opportunity of gaining experience as to the character of each other's action. Soldiers and sailors, in their capacity as such, meet only under two circumstances, viz. :—

a. When a naval brigade serves on shore.

b. When troops are embarked on board ship for the purposes of transport.

In the former case the Navy are taken from their own work and are employed in soldiering; I do not say that we may not, and do not, learn something from them, but, well as they work on shore, the fact remains that it is our profession to fight on land, and it may be assumed that we know something of it. In any case we can thus learn nothing of the essential duties of a sailor, or of his manner of fighting on his native element.

In the second case, as soldiers are rarely embarked on a fighting ship, they can learn nothing from their experience save great respect for the regularity of the discipline of the ship and for the handiness

of the crew. Of their fighting conditions we can know nothing, their fighting tactics we cannot even guess. How then can we be expected to appreciate the existence of a system of tactics for ourselves which by its nature must be dependent upon that in use by the Navy?

It is an axiom in war that the tactics of the defence are derived from those of the attack, and it is moreover certain by the conditions which affect engagements between ships and forts that the action of the former will be always offensive, while that of the latter must be limited to a purely passive defence. It therefore follows that, in order to arrive at the principles of the tactics of coast defence, we must first enquire into those of the attack of a coast fort or fortress by a naval force.

Let us then examine some of—

II. *The Conditions under which an Action may take place between a Naval Force and a System of Coast Defence.*

The principal of these appear to be as follows :—

a. The ships can choose their moment for attack and their moment for ceasing to attack, provided always that they retain their mobility.

b. On the other hand, the attack must be made, as a rule, over a space of which every detail should be known to the defence; that is to say, the attack has seldom the privilege, except in a very limited degree, of choosing the point of attack or the road to that point.

c. Since the road to the point of attack will have been certainly foreseen, it will generally be obstructed beforehand with serious obstacles.

d. The ships will therefore be compelled, almost without exception, to devote in future some considerable amount of time, and much of their strength, to the destruction of these obstacles, before they will find it possible to commence the decisive attack.

e. The efforts made to destroy these obstacles will clearly point out to the defence (even if they were previously in any uncertainty) the path of the coming assault; temporary expedients for further obstruction will undoubtedly be used.

f. Where obstacles are provided, and their use is understood, there will, therefore, no longer be any possibility of hastening the completion of an operation by dashing in to close quarters, except at the risk of the destruction of such ships as advance too rashly.

g. The ships will thus, even under the best system of supply, be generally obliged to economize their ammunition, since they may at any time be called upon to fight a relieving squadron.

On the other hand, the fortress, unless it be invested on the land side, will usually be able to renew its supplies, and is not therefore bound to economy. An exception is, of course, to be found in the case of a Colonial fortress which has no communication with an arsenal except by sea.

h. Supposing the action to be fought out to the bitter end, a fortress

can do no more than repulse an attack; it has no power of pursuit, nor can it take advantage of the injury which it may have inflicted on the ships, for it cannot capture or destroy them.

The ships, on the other hand, in order to obtain a full success, *i.e.*, to actually capture the forts, must change their original mode of attack by fire into the weaker form of a landing by means of boats; in order that the latter may be successful, either the enemy must be utterly demoralized, or his powers of defence must have been altogether destroyed.

i. Assuming, however, that, as will generally be the case, the object of the attack is not so much the capture of the forts as the destruction of that which the forts were constructed to guard, the ships will, when once the action of the forts has been so reduced by fire that they can be held in check by a fraction of the squadron, be able to carry out their purpose by means of the fire of the remainder. In this case, a full success may be obtained, even though the forts have never passed from the possession of their defenders.

j. With regard to the respective disadvantages of the stationary platform with a moving target, and of the stationary target with a moving platform, the conditions have until lately been supposed to be of equal effect. But in the light of recent improvements, both in fighting machinery and in the conduct of action on shore, the advantage now certainly remains with the forts, for with the development which we may confidently expect in the system of coast defence, fire at a moving target will become as accurate and as rapid as practice at a motionless object. In the matter of position-finders and range-finders, the defence has an enormous advantage over the attack.

III. *The Probable Principles of the Attack by a Naval Force, with some Remarks on the Defence.*

These may be best examined under the following heads:—

i. A surprise with a definite object, such as the destruction of stores, the cutting-out of ships, &c.

ii. An attempt to force a passage, or to run past the forts, in order to reach an objective which lies beyond them.

iii. A bombardment from a distance of the defences, or of the points which they are intended to cover.

iv. An attack by a strong squadron with a definite purpose, but before the enemy's fleet has been driven off the sea.

v. A systematic attack by a large force, with the object of the ultimate capture and occupation of the port or harbour.

Of these, it is evident that i, ii, and iv depend for their success upon the rapidity of their execution, and that a known condition of readiness for defence, especially in the matter of obstacles, would probably prevent their being undertaken.

i. *A Surprise by one or more Ships, or by their Boats, for the purpose of destroying Stores, cutting-out Ships, &c.*

The great naval war from 1793 to 1814 is full of examples of this form of action; of these, the most brilliant was the cutting-out of the "Hermione" by the boats of the "Surprise" on the 25th October, 1799, a feat of arms which has rarely been equalled and never surpassed either at sea or on shore.

The conditions favourable to such enterprises do not vary very much from those which obtained at the beginning of the century, for they require, now as then, a dark night, a careless defence, and superior *morale* on the part of the attack; but they are now complicated by the electric light, the possible existence of submarine mines, and of quick-firing and machine-guns. The advanced position of modern forts tends also to render them more difficult of execution.

It will be necessary to say but little of them, since the best protection against them will obviously be found in systematic and constant patrolling by guard-boats, while if the element of surprise be thus eliminated, the action of the defence will resemble, on a small scale, the plan which we shall consider later, when speaking of the more serious forms of attack.

ii. *An Attempt to force a Passage in order to reach an Objective which lies beyond the Defences.*

Many examples of this form of action may be found in the history of the river fighting during the American War of Secession; but the details of these have but little value in the present day, owing to the altered conditions of war.

As might be expected, the ships generally trusted to their speed for success, reserving their offensive power for the objective beyond, and such, when possible, would probably be the course followed in these days.

The obvious counterstroke for the defence is to make high speed dangerous by the use of obstacles, and to cover these obstacles and the passage itself by the fire of guns. Recent improvements both in guns and mines will render the destruction of the latter far more difficult than was the case twenty-five years ago, while the fire of the former is both more effective and more accurate than it then was. The expedient of sending on an old ship in front against a line of mines would be of no avail except against mechanical mines (which are obsolete), while if the torpedo nets be lowered the speed of the ships must be diminished; ground mines will, even in that case, be effective.

It is, however, evident that, given the conditions which govern the laying down of submarine mines and the ranges at which guns will be effective against armoured ships, it will often be impossible, where the channel is of considerable width, to deny the passage of it to the attack, even though both shores be armed with guns and mines. But we may

reasonably suppose that such points would not be selected for the site of the defences intended to cover the passage, and that these would be withdrawn to a narrower part of the river or strait.

It must be remembered, however, that by so doing, the defence provides considerable facility for a landing on the part of the attack, and that an assault on the land front of a fort would materially interfere with the efficiency of its action.

iii. *The Bombardment from a Distance of the Defences or of the Points which they Cover.*

In the late war between Chili and Peru there were many examples of this form of action, towns and harbours being bombarded at a range of about 8,000 yards, and we have every reason to suppose that this system of attack, which is practically new to us, will be much used in the next naval war, especially by small squadrons or single ships, detached for the purpose of levying contributions, making a diversion, or of destroying some definite object. This system has, it is true, been called barbarous by many writers, especially by some French authors, but it does not appear to have received such universal condemnation as would justify its rejection as beyond the legitimate sphere of war.

The extreme range at which such a bombardment could be carried on would be limited by the amount of elevation permitted to the guns by their mountings or ports; the shortest range at which battle-ships would be safe from direct fire might be calculated with absolute accuracy, given the thickness of their armour and the character of the guns of the defence. Subject to correction, I venture to say that ships would invariably anchor in order to carry out a long-range bombardment.

To this mode of attack the defenders would oppose the high-angle fire of heavy howitzers, using common shell filled with high explosives, or armour-piercing shell, as might appear best after consideration of the details of each particular ship of the enemy. We have good reason to expect that this description of fire, even though it may in some cases fail to fatally injure the attacking ships, will at any rate force them to keep constantly on the move, in which case the accuracy and amount of their fire would inevitably be much diminished.

Night attacks by torpedo-boats (if necessary extemporized) would certainly be attempted, though, on the other hand, the bombarding ships may retire to a considerable distance at nightfall and return at daybreak. In this case it might be possible for the defence to lay down a system of submarine mines at the probable stations of the enemy's ships.

iv. *An Attack by a Strong Squadron, with a definite Purpose, but before the Enemy's Fleet has been driven from the Sea.*

The fact that the Power to which the attacking squadron belongs is not yet in full and undisturbed possession of the sea complicates this

form of action by the fact that the defence need only hold out for a certain time, or in other words, that the attack must be prepared to engage in a naval action, unless it can obtain a success before the relieving squadron can arrive. The difficulties of the attack are, therefore, much increased by the double necessity of saving time and of economizing ammunition, and this fact clearly points out to the defence that it is desirable to make them waste both.

It is probable then that, in this case, the efforts of the defence should be specially directed to delay rather than to repulse the attack, for the former mode of action will give time for the relieving squadron to arrive, and will tend to weaken the assailants in men and ammunition. If, on the contrary, the attack be permitted to come into close action with the forts, the issue of such action might be unfavourable to the defence; to permit it therefore would serve the purpose of the attack, by rendering it possible for them to bring about at once a favourable crisis.

These are, of course, instances where the use of obstacles is in great part forbidden by the nature of the coast-line; for example, had the Egyptians made use of submarine mines at Alexandria, they could have laid them only in the passes which led into the harbour, and could have gained no advantage from them on the scene of the main bombardment, that, namely, of the forts along the outer coast-line, from Pharos to Ras-el-Tin.

But where, as is usually the case, the harbour is either partially landlocked or lies in a bay, the delaying action of obstacles will be of very great advantage, playing as they do, when taken together with their covering forts and batteries, the part of the advanced defences of land fortresses, and in a similar manner keeping the enemy at a distance, obliging him to undertake a preliminary attack, and to carry it through before he can commence decisive action against the main defences.

But it must not be forgotten that we must still take account of the effect of long-range fire, and of the fact that by means of it a squadron can often perform its task without actually capturing any portion of the defences. This point concerns, however, rather the system than the tactics of the defence, and is a matter to be taken into consideration before hostilities commence, when selecting the sites of such batteries as are to be used for high-angle fire.

v. *A Systematic Attack by a large Force, with the Object of the ultimate Capture and Occupation of the Port or Harbour.*

It is to be noted that an operation of this kind will, in general, be carried out by a combined attack by sea and land; but in the present paper we have no concern with the latter portion, which, though identical in its aim, will be for the most part distinct in its design from the former.

We may in this case assume that any interruption of the attack by a relieving force is either impossible or a remote contingency, and that the assailants, being free from all need to hurry, will proceed by

regular stages, and in such a manner as will be most likely to ensure eventual success with the least possible expenditure of men and matériel. It is further worthy of remark that, since the attack intend to possess and make use of the captured port, harbour, or dock-yard, they will not, except under extreme necessity, be inclined to destroy (by long-range fire or otherwise) that which, as they hope, may become their property. It is probable, indeed, that the attempt to so destroy any portion of the objective beyond the actual defences, may be taken, in many cases, as a proof that the assailants have given up the expectation to capture; it may thus often be the first sign of the intended abandonment of the enterprise.

Whereas in the former case the attack on the forts and batteries would have for its object to make them so far innocuous, that the attack should be able to carry out its work of destruction, the object in this case will be to drive out the defenders from them, and to actually seize and occupy them. It will not be sufficient to merely engage their attention—they must be silenced and captured.

Thus the destruction and passage of the mine-fields will be but a preliminary to the great artillery fight, and the whole action of the later stages of the attack will be more vigorous, as its effect will be more decisive.

Whereas, therefore, in the former case the fire of such ships as engage the forts will be principally directed with a view to covering the ships which bombard the objective point, and will thus be fairly evenly distributed over such batteries as can bear on those ships, we shall, I believe, find that, when absolute conquest is desired, the fire of certain designated ships will be concentrated on each of the defences in turn (commencing with those which are the most exposed) and continuing until the abandonment or surrender of each is compassed; other ships will probably be in the meantime employed in attracting the attention of such collateral forts as may be for the moment beyond the sphere of decisive action.

The arrangement of the defences in such a manner that no fort can be exposed singly to such an attack is, of course, a question of construction, in time of peace, and not one of tactics. But it is one which must be borne in mind, taking into consideration the character of the site and the soundings in its vicinity.

The action of the defence with regard to delay must be governed by the circumstances of the case; for example, by the strength of the enemy's fleet as compared with its own force, and by the probability of the arrival of reinforcements to either side; it may thus, possibly, be desirable to allow the attack to come at once to close quarters as soon as possible. In this case the mines would not be used for the purpose of delaying the enemy's advance, but with the object of refusing to him such portions of water as are the least efficiently swept by the fire of the guns, and also of limiting the extension of his line of fire.

Let us now pass on to consider—

IV. *The Principles of the Use of the various Portions of the Armament of a Coast Fortress.*

It will be convenient to divide these under the following heads, viz. :—

- a. The guns.
- b. The submarine mines.
- c. The torpedoes.
- d. Water defences : such as guard-boats, &c.
- e. The electric light.

a. *The Guns.*

I have preferred to speak rather of the guns than of the forts or batteries, in order to lay stress upon a point which is too often lost sight of, namely, that the forts should be constructed to cover the guns, and not merely the guns used to arm the forts ; by this I mean that the position for the guns should govern the construction of the fort, and not be governed by it.

It is probable that in future the artillery armament of a fortress will be divided into three parts, and that the design and mode of construction of the cover for each of these three fractions will differ essentially from those of that intended for the others ; the site of this cover will also vary for each.

i. *The Heavy and Medium Guns intended for Direct Fire on the Enemy's Battle-ships.*—These guns will, wherever possible, be posted (the medium guns in batteries, the larger in separate emplacements) as high above the level of the sea as may be compatible with the power of commanding all water in their front which is of sufficient depth to allow of the passage of a battle-ship. The works designed to contain them form, as it were, the *enceinte* of the sea-front of the fortress, and it is upon their action, in the case of a systematic attack, that the ultimate success or failure of the defence depends.

It is most important that they should, as far as possible, be concealed from the enemy, or should be rendered to some extent invisible, either by the nature of the background, by the choice of site ; or by their own colour and form ; but, nevertheless, no portion of their offensive power should be sacrificed to the desire to obtain immunity from fire. These batteries are the true fighting-line, and must be prepared, both by construction and by armament, to resist a heavy and even a concentrated fire from the enemy. Great care will, above all, be needed in deciding upon the number, size, and position of their magazines.

Each of these forts or batteries should in action be an independent command, forming, as it were, a unit of the defence ; and the conduct of the action in each individual work should be rendered easy by an organization and a system of command carefully laid down and practised during peace.

Either in or near each battery or fort a station must be provided for the commander and for such apparatus as he may need for con-

ducting the fire, whether this be a position-finder or a range-finder; this station should be rendered at least moderately secure from the fire of the enemy, either by concealment or by the construction of cover. It is evident that it should, when possible, be outside of the fort, both with the above object and, also, because otherwise the view of the commander will in many instances be interrupted by the smoke of the guns. It is further urgently necessary that the commander shall be supplied with some means of communicating instantaneously with each and all of the guns or sections of his command; without such communication the systematic conduct of fire is impossible.

ii. *The Guns or Howitzers which are intended for High-angle Fire.*—The positions for such guns may be selected within large limits, as it is not only unnecessary, but is in some cases even undesirable, that the enemy shall be visible from their site; they may thus be placed at any convenient spot which will enable them to make good use of their length of range. It will not in many cases (especially when the character of their position will permit their smoke to be invisible to the enemy) be necessary to construct any form of parapet in front of them, but it will be often most desirable to arrange for any necessary change of position by means of a tramway, the mountings being fitted with removable axles.

The object of their use is two-fold, viz.: to prevent the enemy from anchoring within their range, and to keep down the long-range bombarding fire of the attack; in each case they act by high-angle fire directed against the decks of the enemy's ships. There are two essentials to the efficiency of their action, an ample supply of ammunition, and a considerable number of guns. Though the high-angle fire of heavy howitzers has been found in practice to be exceedingly accurate in still weather, yet its efficiency must evidently suffer from many disturbing causes, owing to the low muzzle velocity of the shell. It is further necessary that its action shall partake somewhat of the nature of a surprise, for an enemy's ship which has received a bouquet of shell around her berth will probably move away as quickly as possible, and thus another sitting shot may not be possible; again, even with our improved system of directing fire, the effect of high-angle fire on a moving target cannot, if only on account of the time of flight, be confidently calculated upon. It is, therefore, necessary to make up for the comparative uncertainty of high-angle fire by the expenditure of a larger amount of ammunition.

It is absolutely necessary for the efficiency of these howitzers that steps shall be taken to ensure the most accurate observation of their fire, and for this purpose an observing station must be selected such that, while it is not conspicuous to the enemy, it may enable the fire of the guns to be easily watched; one station will be sufficient for a large number of guns, provided that it be supplied with means of immediate communication with every possible position of the guns. It may frequently be of advantage to use these guns by night for the purpose of annoying the enemy, or of driving him from his anchorage; in this case the range and bearing of the ships will generally be obtained by day.

It will be observed that, by the nature of their positions and to some extent of their armament, these guns will not be able to defend their front, and care must be taken that neither they nor indeed any of the advanced batteries are left undefended against the attacks of landing parties.

iii. *The Light Armament.*—This will include: 1. The movable armament, and 2. The armament intended for the defence of mine-fields and other obstacles.

Of the former I propose to say very little; it will generally be composed of field-guns, and will be used to aid in repulsing the attack of landing parties and also to assist in the defence of obstacles. It will further be probably employed on the land fronts of large fortresses.

The armament intended for the defence of mine-fields consists, I understand, principally of quick-firing guns; it will be well to consider the conditions under which these will be called upon to fight.

We may, I presume, assume that operations against mine-fields will rarely be attempted except by night, and that for preference a dark night will be selected, while every means will be taken to conceal and to cover the boats engaged in the work of destruction.

It appears, therefore, that these guns will have to fire on a small target, which will be moving with great rapidity, and of which all view will as far as practicable be denied to them. These are conditions of peculiar difficulty, and can be met only by adequate training and previous preparation. In theory it is, I presume, intended that the number of projectiles fired shall in some degree make up for the probable inaccuracy of the majority of them, and thus quick-firing guns are selected; but I may perhaps be pardoned if I add that I do not feel convinced that quick-firing guns are the best possible weapons for the defence of mine-fields.

But we have now only to consider how the fire of such guns can be made effective under the most unfavourable circumstances. In the first place we must, I think, lay down that their emplacements should be permanent, though the guns themselves need not be placed in position until they are required. Each emplacement, or mounting, should moreover be provided with some means of giving the necessary elevation without looking over the sights, and also with the means of giving the requisite training to each gun by some form of graduated arc. In addition to this, each emplacement should be provided with a plan of the mine-fields, showing the ranges and bearings of the various portions. It may by these means be possible to bring an effective fire to bear upon a totally invisible target, since the guns can thus be laid on any desired section, though the target be invisible.

I shall here be probably reminded of the existence of the electric light, but I would ask those of you who have seen it in action whether they have also observed the effect of—

1. The smoke of our own guns;
2. The smoke of the enemy's guns with a wind blowing on shore; and

3. Rays of light thrown by the enemy's ships either across our ray, or directly on the guns.

With regard to this last I am prepared to own that by so doing the enemy will enable us to lay our guns on his light, but to do so would answer his purpose and divert our fire from its principal object, the defence of the mine-fields.

Be this as it may, it is wiser to be prepared for the worst possible conditions, and to arrange that the power of vision, which may be out of the question, is not necessary.

Two other points yet remain for notice. First, it is desirable that the emplacements for the quick-firing guns shall be distinct, and even separate, from those of the main armament, both in order that they may not suffer from the fire directed on the latter, and also that they may be as far as possible rendered indistinguishable from the ships. They must, however, be at the same time so placed or so covered that they will not be liable to attack by landing-parties, for such an attack would, under many circumstances, be the best possible way of attracting the attention of the defence from operations against mine-fields.

Secondly, it is absolutely necessary that some system of communication shall be arranged between—

- i. The guard-boats and the quick-firing batteries; and
- ii. Between the observation parties of the submarine mines and the guard-boats;

for otherwise the presence of the latter may either paralyze that of the other two fractions, or they may, on the other hand, suffer by their premature action.

b. The Submarine Mines.

In touching upon these I feel that I am venturing upon rather delicate ground; with guns I am at home, but submarine mining is rather like a carefully preserved covert, from which trespassers, and above all, poachers, are rigidly excluded. I should not propose, even if I were fully competent, to go into any question of the technicalities of the branch, but rather to endeavour to suggest an answer to a question with regard to which I have up to the present been able to obtain no information. I do not venture to state that my solution of the problem is the correct one, but I wish to deliberately excite discussion, in order that the tactical, as distinguished from the technical, handling of submarine mines may be thoroughly ventilated.

My question is as follows: "Which is the auxiliary and which the principal arm; the guns or the mines?"

The answer which I propose is: "The guns are the principal, the mines the auxiliary, arm." For this I will give my reasons, merely premising that, to my mind, the entire system of coast defence rests upon the decision of this point.

These reasons are—

- i. A system of defence which should depend upon guns alone is intelligible and possible, but not so one from which guns are excluded and mines only used.

- ii. The defence of guns is active, that of mines passive.
- iii. The destruction of mines is a matter of time; the silencing or destruction of guns requires something more.
- iv. Guns are always ready; mines require careful preparation and constant care and renewal.

Observe also that mines have destructive power only so long as their existence is unknown: for we may, I think, assume that no enemy will in these days wilfully charge a mine-field. When mines are known to exist they fall into the character of obstacles, which cannot certainly be neglected, but can certainly be removed. From these facts (if facts they be) I venture to draw the conclusion that mines have two uses: (i) to delay the attack; and (ii) to deny particular areas to the enemy; serving thus either to keep, or to drive, the enemy under the guns; and further, that mine-fields which are not well under command of the guns are insignificant as obstacles, and cause but little loss of time to the attack.

From these statements I deduce the conclusion that the system of mine-defence should, in places where the gun-defence is already settled, be dependent upon the latter, while, where both are in embryo, they should go hand-in-hand, since those who fight the guns should certainly be consulted with regard to the position of the auxiliary defence. To do otherwise, and to work solely in connection with the soundings, is as if a man should in siege warfare make a mine at a certain spot, not because the mine was needed, but because the soil was suitable for mining.

I am inclined, therefore, to believe that the following should be the order of sequence:—

- i. The main armament of guns; this to rule the
- ii. Submarine mines; these to govern the
- iii. Light armament.

c. Torpedoes.

These differ essentially in their nature from mines, in that they are not obstacles but projectiles, exactly as are shot and shell, except only that the medium through which they move is water and not air. The air torpedo, as fired by the pneumatic gun, forms, as it were, a connecting link between the two.

Following this line of argument, it would appear that torpedoes should be in the hands of those who have to do with all other projectiles, *i.e.*, of the Artillery; but, by some curious process of reasoning, they have been handed over to the Engineers.

If we regard the torpedo as a projectile, we shall find that it differs from the submarine mine by the fact that, like other projectiles, it cannot be rendered innocuous or abolished (as mines and other obstacles may be) before the commencement of the contest, but must be accepted and warded off. Torpedoes are, in fact, submarine artillery, though of low velocity and consequently limited range, and should thus be employed on principles similar to those which obtain with regard to the other projectiles of the defence, in comparison with which they have, however, one disadvantage, in that they cannot be

used for the defence of mine-fields, since their explosion in the same element would injure the very objects which they would be intended to protect.

I may perhaps draw attention here to the fact that torpedoes, both air and water, may be used for the destruction of mine-fields; the former will be especially valuable for this purpose, as their attack cannot be kept off by any obstructions, while their bursting-charge can apparently be almost indefinitely increased.

d. *Water Defences.*

Concerning these it will be necessary to say but little, since nothing can be decidedly laid down, either as to their organization or their use, as they will probably be extemporized, and will thus depend, both for their amount and that of their crews, upon the resources of the port or harbour. They will be practically the light troops, the outposts of the defence, preventing the action of corresponding forces of the enemy, and giving warning of any movement on his part. They will probably be provisionally armed in such a manner as may be found possible, but a certain proportion of steam launches must undoubtedly be provided.

Their duties will, as a rule, be discharged by night, and their main use will be to protect and watch the mine-fields, and to cover them from attack. Unless carefully handled and skilfully worked they will be very liable to hamper the artillery defence, and also that by mines, and should, I venture to suggest, be withdrawn before a systematic and determined attack on the mine-fields, while they should resist the action of isolated parties.

One great difficulty which will arise in connection with them is the question of their command; but this is, I think, capable of arrangement on the following principles:—

The defence of a coast fortress may be divided into—

- i. The active defence, consisting of any ships which may be available for operations outside the harbour; these would of course be under the command of the senior naval Officer, acting in conjunction with, but independently of, the commander of the fortress; and
- ii. The passive defence, which has been already partially described, and which should be under the command of the Officer commanding the fortress.

The water defence, as described above, falls under the passive defence, and should, I submit, be under the same command as the rest of that section; whether the Officer commanding the fortress should be a soldier or a sailor is, I believe, considered by some to be open to argument.

If this principle be accepted, it follows that, where the commander of the garrison is a soldier, it would be better not to employ naval Officers with the water defence, but to keep their services for use with the active defence; the guard-boats, &c., I should in that case propose to hand over to Officers of the merchant service, taking their crews from such of the population as were accustomed to the management of boats.

e. The Electric Light.

We are all acquainted with the use of the electric light, and I need not dwell on the advantage of being able to some extent to turn night into day, by employing it for illuminating mine-fields and targets of all kinds. But there are some difficulties connected with it on which a few words must be said.

The employment of the electric light is perfectly simple so long as it is a question, as it has generally been with us, of one gun (or one group of guns) and one light; but we shall find the matter very much more complicated if we endeavour to work out a system for the combination of the action of several forts and several lights.

I am inclined to think, on consideration, that the only plan to avoid difficulty is to allow a light to each unit, and to place it under the command of the commander of that unit. Nothing but confusion can result from the unconcerted employment of several lights by independent observers, who work neither in combination with each other nor with the guns, and are not connected with any other portion of the defence by any means of communication quicker than an orderly. I therefore venture to offer the following suggestions:—

- i. Each fort or battery should be provided with a light.
- ii. This light should not be posted in the battery, but at some distance to one flank; both in order that it may not be struck by shells aimed at the battery, or point out the position of the latter, and also because the beam of light itself is a disadvantage to anyone standing in rear of it.
- iii. Wherever it may be, it must be under the orders of the Officer commanding the unit to which it belongs, and its movements must be directed by him alone; thus only can it be correctly used in real conjunction with the guns.
- iv. There must be electrical communication between this Officer and the light. There would, I believe, be no difficulty, electrically speaking, in making an arrangement such that the light should be automatically moved, so as to throw a beam on any spot upon which the telescope of the Commanding Officer might be directed; but this would, of course, cost money.

v. It would probably be found convenient in practice to make a rule that no fort which is not engaged shall show its light.

As time goes by, and the use of the electric light becomes more general, it may be perfectly easy to provide a light for each fort, but this we cannot hope for at present; such lights as we have, should, therefore, I suggest, be especially told off to those batteries which are intended to defend the mine-fields.

I do not propose to enter here into any question of the technical working of the electric light, farther than to say that it should, as far as possible, be automatic, even down to the substitution of a fresh pair of carbons; but I do desire to draw attention to the necessity for the instruction of the Royal Artillery in its use, even though a complete equipment be not handed over to their charge.

The light is far more essential to guns than to mines, as the latter

signal automatically the approach of the enemy, while the former are useless in the dark; the guns and the light should therefore be in the same hands. Moreover, though we have every confidence in the skill and energy of the sister corps, whose motto is also "*Ubique*," yet we do not find that they are as ubiquitous as we; for example, there are twelve stations provided with artillery for coast defence, not one of which has a corresponding company of engineers. Something has already been done towards the object which I suggest, but more remains to do.

Balloons would probably be of great assistance, both by day and night, in directing and observing fire, and in generally assisting in the work of the defence.

V. *Further Details of the Tactics of the Attack by a Naval Force on a Coast Defence.*

Ports and harbours which are liable to attack from the sea may be roughly divided under three heads, viz.:—

i. Open roadsteads, from which a more or less narrow passage leads to the harbour proper; of this kind Alexandria affords a good example.

ii. Closed harbours with narrow entrances, such as Sydney or Portsmouth.

iii. Intermediate varieties, such as Plymouth or Cherbourg, where a naturally open harbour is artificially closed, but of which the outer line of defence practically presents the characteristics of the first kind.

i. (a.) It is evident that a long flat front of defence offers the greatest facilities to the attack from the sea, since it permits (to use a military term) of the deployment of the whole force, and of the consequent concentration of fire on individual forts, while at the same time it implies the comparative dispersion of the latter, with all its attendant disadvantages as regards unity of command and consequent unity of action.

It may be urged, on the other hand, that the fire-action of a fleet will, under such circumstances, be developed over a considerable length of coast, and will thus suffer as regards its intensity; but this disadvantage is more apparent than real, since it is not the whole coast, but merely a series of points on that coast, which must be overwhelmed with fire.

The action of the fleet against defences so situated will probably be somewhat as follows, assuming that an actual silencing of the forts and an eventual landing are desired.

1. The development of fire all along the front, carried out by ships detailed to each fort for this purpose; these ships to open a deliberate fire at a range beyond that at which their armour can be pierced by the guns of the defence, with a view to inflicting injury on the personnel of the forts, to destroy overhead cover, &c., and in such a manner as may retain the attention of the garrisons, and may at the same time diminish the resisting power of the works.

This fire should be delivered at comparatively long range, in order to take every advantage of the facility for searching cover which will be given by the high angle of descent.

2. The concentration of fire from certain selected ships on each of the forts in turn, beginning probably from a flank or, where the force of the assailant is far superior to that of the defenders, from both flanks. This fire to be delivered at decisive ranges, and to be directed as regards the heavy guns upon the armament, while the quick-firing and machine-guns will act against the personnel of the defence. Every endeavour will, of course, be made to enfilade one or more faces of each of the works attacked.

3. When the main armament of the forts has been silenced, the guns of the attack will be turned against the subsidiary armament; when this has been destroyed, the landing will be covered and supported by the use of quick-firing and machine-guns. If the attack be made from a flank, it may be possible to effect a landing on that flank as soon as the first fort is silenced; such action would tend to materially accelerate the capture of the others.

(b.) The consequent tactics of the defence.

The capability of defence of a position of this kind depends entirely upon the height of the forts above the sea, as it is governed rather by the power of resistance of individual forts than by any power of reciprocal support between them.

For example, if the batteries are in this case only a few feet above the level of the sea, the several works will be badly placed as to site for the purpose of independent resistance, while the fact that they lie as it were in a string, along the shore, prevents any possibility of satisfactory mutual assistance. Under such conditions all tactics will be useless owing to the original faults in the choice of site.

If, on the contrary, the forts, though on an extended line, have yet some considerable elevation above the sea, they will be comparatively secure from the enemy's fire (and above all from the dangers of enfilade fire), and may thus be able individually to cause so long a delay to the attack that neither time nor ammunition will suffice for their capture.

We may, I think, lay down as an axiom that—

Whenever, owing to the character of the site or from other causes, several ships can concentrate their fire on a single fort, while the latter, for similar reasons, can receive no assistance from the fire of collateral forts on the ships, the ultimate success of the latter is certain, and the excellence of construction, the weight of armament, and the other good qualities of the fort in question will, at the best, tend only to prolong the contest.

It is of course possible that, in many cases, such delay may be invaluable, but it then becomes a question whether the same results may not be obtained by other and less costly methods than building a fort.

ii. (a.) The attack of the entrance of a harbour, or of a channel leading to a harbour.

In this case the conditions which obtained in the last example are exactly reversed; it will probably be impossible to deploy the entire forces of the attack, and it will also, owing to want of space, be impossible to reinforce the ships which first engage, while their relief in case of need will be a difficult matter.

On the other hand, the fire of the forts will, as a rule, be converging, while the guns will have been so placed as to command the line of advance to which, as I have before pointed out, the ships will be bound. In other words, the initiative of the attack will be lost, for no such initiative remains to a commander who is compelled to attack through a defile. This advantage of the defence will, of course, be greater or less in proportion as the defile is more or less narrow.

It is possible that in certain cases the attack may commence by a bombardment at long ranges, directed either on the forts or on the establishments which they cover; but where time is limited, or ultimate capture is intended, such a bombardment will almost certainly be omitted, as causing delay and expenditure of ammunition.

The next phase will probably be the preparation of a passage through the mine-fields, while this again will be followed by the decisive attack. Of these the former will proceed on regular lines, which are already perfectly known, and into which there is no need for me to enter.

We may then pass on to the grand attack. A fleet which intends to bring matters to a crisis will move into decisive ranges; in other words, in its desire to inflict mortal injuries, it will advance to within armour-piercing distance of the forts, that is to say, to such a range that its own batteries will be liable to be penetrated by armour-piercing shell, while the remainder of the structure, above the belt, will suffer from common shell from large and perhaps from small guns.

I will next proceed, subject to correction from naval Officers, to endeavour to describe the probable course of this phase, merely premising that the decisive attack will almost certainly take place on the day immediately following the opening of a sufficient passage through the mine-fields, with the object of refusing time for any possible repairs or additions to the latter.

The ships will advance in one or more columns, according to the width of the space available, and will move, as far as possible, directly on the forts, since the more direct the advance the greater will be the cover given by the leading ship to those which follow her.

On arriving within decisive range of the fort, the ships will change direction in succession and pass the fort broadside on in line ahead, each ship delivering her fire as her guns will bear, and concentrating from the first, all available action of quick-firing and machine-guns on the embrasures, ports, and gun-emplacements. This manœuvre will, of course, be limited to occasions when there is sufficient sea-room for its execution.

In other cases (and, indeed, I am inclined to think, whenever a quick decision is desired) the ships, having moved in, will anchor in

stations previously settled, using from thence the utmost weight of their fire upon the single fort whose capture may be for any reason deemed most desirable.

It may, perhaps, be well that I should here give my reasons for considering that ships which mean real work will anchor; they are:—

1. By so doing they will improve the accuracy of their fire, owing both to the cessation of movement and to the fact that the range will not change. The same may be said of the fire of the fort, but it is certain that the ships will have a numerical superiority in guns over any single fort, and the advantage to them will thus be greater than to their enemy, while the accuracy of their own fire will, as ever, prove the best possible safeguard against excessive loss by that of the enemy.

2. One of the ships, or perhaps more, will probably be able to take up a position where she will be out of reach of most of the guns of the fort (or of the collateral forts), whereas, when moving along the front, each ship will in turn pass the point on which the majority of the guns of the fort may with the greatest ease be concentrated.

3. Any station from which some part of the fort may be enfiladed will probably be so cramped, owing to its proximity to the shore, that movement in it will be dangerous, if not impossible; while it may happen, where the system of defence has not been well considered, that a ship may be able to place herself where she is defiladed from the high-angle fire of the defence by cliffs or other obstacles.

ii. The consequent tactics of the defence.

We may take it, I think, that in this case, as in all others connected with artillery, the main principle of the defence must be founded on the concentration of fire.

Fire will of necessity be concentrated on the leading ship as she heads the advance, and we may fairly hope that, since the direction of her length is extremely favourable to effect, she may be in some cases put out of action, or at any rate materially weakened, before she arrives at a decisive range. Since while she is advancing it will be almost impossible to injure her battery, and very improbable that we shall hit her water-line, our efforts must be directed to clearing her decks and tops, and to the destruction of her bows. With this object common shell should be used against her upper deck, and machine-guns should be directed on her tops. If she carries her heavy guns "en barbette," shrapnel burst well up will probably be the most effective projectile against them.

It is evident that in this practice the line will be of the greatest importance, and the guns should, therefore, when possible, be laid over the sights. If by good fortune the leading ship can be disabled while working through a narrow channel, it is obvious that a great check will be given to the attack, since it will be necessary to remove her in some way before the remaining ships can advance.

This species of fire will continue until the leading ship presents her broadside, and is in such a position that the majority of armour-piercing guns can bear on her.

The most favourable point for fire can be discovered beforehand by the Commander of the fort, and the guns should be ready, loaded with steel shell, by the time that she arrives at it. The requisite elevation can be easily given by means of the elevating arcs, and the concentration of fire can be ensured (if the matter have been taken in hand before the action) by allowing on the racers for the distance of any particular gun right or left of the gun of direction. The guns will be fired in salvo, if possible, at such a moment that the shell may strike the battery of the ship.

The medium and quick-firing guns will continue to fire at the unarmoured ends, unless the ship have barbette guns, in which case they will concentrate their attention on them and on the conning-tower. The machine-guns will fire in part at the tops, while some of them will be specially told off to fire on the barbettes, and others at the ports of the deck armament and battery. It will probably be well that a machine-gun should hold to one target throughout the passage of each ship.

The same process will be gone through as each ship in succession arrives in front of the fort, and the former tactics will be repeated against the stern of the last ship as she draws off.

Unless the interval between ships be very great, there will probably be time for no more than one round at each as she passes; and it will be as well, under ordinary circumstances, to limit the fire to this, in order that the guns may certainly be ready for each in turn. At least twice as many rounds as there are ships of the enemy should be at hand in the battery before the enemy's movement commences, half of these to be armour-piercing and half common or shrapnel shell, according to the orders of the Officer commanding.

As soon as the fire of any gun becomes ineffective, owing to the range or the angle at which the enemy has retired, every effort must be made to clear away all wreckage, and the dead and wounded, and to re-fit; fresh supplies of ammunition must be immediately brought up.

Should the enemy, either at once or at a later period, adopt the second form of attack suggested above, viz., the concentrated fire from anchored ships at decisive ranges, it will be for the Officer commanding the fort to order either the division of the total number of guns among the ships, or the concentration of fire upon each of them in turn. As a matter of principle it might be well to divide the light armament, and to keep the heavy in hand, so as to be able to throw its weight upon any ship from which the fire was especially annoying.

I would suggest the use of common or shrapnel shell against the unarmoured ends of all ships which are end-on to the work, and of fire against armour with steel shell only in cases where the broadside is fairly turned to the fort; an exception should, of course, be made when it is known that the armour of some particular ship is peculiarly thin. Should the Officer commanding the fort consider that he has frequently struck a certain space of the ship's armour, he may try the effect of a salvo of common shell laid on that point.

It is further evident that the collateral forts must use their best endeavours to assist the work which is first attacked, and they should do so with the larger proportion of their armament, paying comparatively little attention to the fire which is directed on themselves. The high-angle batteries, after ascertaining their range, should fire large salvoes, in order if possible to compel the enemy to shift his ground.

iii. The third case which I have mentioned will evidently require a combination of the two systems of attack which I have attempted to describe, and the modes of defence will be similar. It will therefore be necessary to make no further mention of it.

With regard to the whole of these questions, I would ask that what I have said should be considered rather in the light of an explanation of the principles of a suggested plan of defence, than as a strictly definite system for rigid application. We have at present no sufficient data upon which to found a detailed system of defence, and it has been my endeavour merely to offer for discussion a scheme so far connected that it is capable of being analyzed.

The plan of defence best suited to each fort will vary with its position and armament, as also with the manner in which it may be attacked; much of it must, therefore, be left to the inspiration of the moment, but we must, nevertheless, not forget that all preliminary arrangements must be worked out in time of peace, and that the garrison must be trained and practised in the details of all possible forms of action.

It may be considered that the system which I have suggested is too complicated for use under fire; it appears so only because we have too long held to the elementary principle of the independent working of individual guns—a principle which entirely prevents the possibility of concerted or united action—and have even as yet scarcely realized how necessary, in addition to mere drill, is a true war training.

I hasten, however, to acknowledge, and even to emphasize, the fact that the above system, or indeed any which will certainly ensure the concentration of fire, is only possible on condition that the organization and war training of coast forces, regular and auxiliary, shall continue to advance.

This leads me to remark that, lengthy as this paper is, I have barely succeeded in opening the subject of it, while I have of necessity been unable to say anything whatever with regard to an equally important matter, viz., the organization and training for coast defence.

Colonel E. T. THACKERAY, V.C., C.B., R.E.: With regard to the conditions referred to at the commencement of Colonel Walford's paper, I will just add one point that is perhaps not quite sufficiently impressed—I mean with regard to the new explosives. Colonel Walford has referred to the pneumatic gun. The Zalinski pneumatic gun, of which an account was read in this theatre on the 27th January, 1888, throws a shell containing 600 lbs. of blasting gelatine or 900 lbs. of gun-cotton with disabling effect on ships at a distance of 50 feet. What would be the effect upon ironclads of projectiles of such a description? We are often told that history

repeats itself. May I be allowed to refer to an incident that took place at Gibraltar in 1782, more than 100 years ago, when forty-seven sail of the line and ten battering ships attacked a fortress? The attacking squadron was composed of the French and the Spanish Fleets combined, assisted by land forces. On this occasion the efforts of the garrison were directed solely against the ships, and they paid no attention to the land fire. On the first day the flag-ship and two other ships were destroyed by fire, and on the following day three ships were burned to the water's edge. I only mention that fact in reference to the effects that may happen from the employment of the new explosives, and it may be similar to what occurred before, as shown from history. There is only one other point. Is it not probable that attacks on coast fortresses will take the form of a combined attack by land and sea? Such attacks were made by the French and Spaniards in 1782 at Gibraltar, by the French and Americans at Savannah in 1779, and at Minorca by the French and Spaniards in 1781.

Colonel TULLOCH : Mr. Chairman, not being a naval Officer nor an artilleryman, I have considerable diffidence in saying anything with reference to the attacks of ships on forts ; but, on looking over the history of attacks on shore batteries or forts, I think the general impression left on the mind is that the shore batteries, even in a small way, have generally got the best of it. You may remember specially the case of the attack on a battery in the Scheldt in the old French war, where the battery consisted of one 24-pounder howitzer, the result being that the French 80-gun ship had to withdraw with considerable loss, eighty or ninety men being killed and wounded. I merely mention this because Colonel Walford referred to the case of ships going in and attacking first-class fortresses. After the last experience we have had of iron ships attacking forts, we have found that even very indifferent forts can hold out a pretty considerable time ; in fact, at our last experience, when it was all Lombard Street to a China orange, we took seven long hours before the orange was sucked dry. Now, in modern actions, where a heavy fire has to be kept up, the shells are very large indeed, and the ships will not hold any great number of them, and after a certain time the shells and the ammunition are used up. In former days you could engage a battery with plenty of ammunition and to spare ; now it is not so ; after a comparatively limited number of rounds your ammunition is gone. There is another thing with reference to the attack on forts. The smoke from the firing of the guns is so tremendous that it is almost impossible to see anything for a long time, and you have to cease firing, but the forts do not cease firing at the ships, whose lowest spars are always visible over the smoke as guides for firing on. I was the other day watching the French Toulon Fleet firing at a towing target. After a very few rounds from the big guns the ships had to shut up altogether on account of the smoke, but I particularly noticed that the most effective work was done by the smaller and less smoke-producing quick-firing guns, and the way in which they knocked up the water all round the target showed the immense value of this new species of armament. I do not propose saying anything more, as I merely wish to help on the discussion, and to show that in cases where ships have to attack forts they will, if possible, avoid doing so ; more especially if there should be any hostile ships anywhere in their vicinity which might suddenly attack the bombarding ships with their nearly empty magazines.

Admiral COLOMB : It is said that when epidemic diseases arise where there are negroes, the negroes are much more likely to be affected by those diseases than white people, and that if they are affected there is great difficulty in keeping them alive, because they have so concentrated their minds on the preparations for dying. Now, I cannot help remarking that it is somewhat the same with us at the present time, that our attention is so very much turned to this preparation for Imperial dying. We have had a lecture to-day which directs our study chiefly to conditions when the Empire is at least moribund, because the necessity for the defences that we have heard spoken of, cannot arise until the Empire is so. But the lecturer has redeemed his case a good deal, because he has given us rather more of the tactics of attack than of the tactics of defence, and for that I commend him. I do not feel that in this case he is wrong in treading on naval ground, in putting forward what his views may be of the tactics of naval attack of fortresses, because it is a matter which should engage the military mind as much as the naval mind. So far as I

know, there will be very little pure naval attack by us on any fortress. I quite agree with what Colonel Tulloch said, that we cannot do much in attack by purely naval means. I think the lecturer has laid a great deal more stress on what ships can do against forts than naval Officers would use as a rule. I think our feeling is, judging from the past, that we must have in nearly all attacks that we make on territory, not only the assistance of the sister Service, but that the main part of the business will be in the hands of the sister Service, only assisted by the Navy. Then as to the conditions under which the attack can be made. I am glad to note how the lecturer has pointed out that to make a territorial attack you require a free sea behind you, for at least a time; but I do not think he has laid sufficient stress upon that. I think we in the Navy are coming quite to a clear conclusion now that, except for the throwing of a few shells by way of insult by a single cruiser, and that sort of thing, no territorial attack can take place unless the enemy has an absolutely free sea behind him, and I think in dwelling upon the nature of the obstacles, and especially submarine mines, he is right to show that the attack by ships on territory, on fortresses, on harbours, and so on, is removed one stage further off. I think that the general condition of opinion is, in the Navy, that on the whole the advantage as against the Navy remains with the fort—that is to say, that less fort will now be more effective than more fort was in the good old days of war. In speaking of surprises and cutting out, those are matters which really do not affect the tactics of either attack or defence, because they are in the nature of surprises, sudden businesses which it is impossible to prepare for, which are done, as the lecturer said, in a dark night, suddenly; therefore, I do not think you can treat them in the general way at all; each case must be taken separately. As regards forcing passages, I am sorry the lecturer should have thrown aside so readily the experience of the American Civil War. In all these cases I do not think we can go beyond the experience that is before us, and I cannot admit for one moment that the experience of the Americans in the Civil War is obsolete. I think we should apply ourselves to the study of what was done by the American Navy in those cases. What seems clear from American experience is that the forcing of a passage past forts is a comparatively easy matter if there are no obstacles to be encountered, but that it is an exceedingly difficult matter to force a passage if the ships are to be delayed under the guns in trying to force that passage, and the great power of the submarine mine seems to me to be that it will do that. But then what happens? It throws the ships again still further back, and makes the difficulty of these passages greater still, and points out that if you are called upon to pass forts you will have to settle down regularly with the sister Service and possess yourself of the forts and of the mines too before you attempt to make your passage. As to bombardments from a distance, I think that there would be unquestionably for a superior naval force—for the nation which had the free sea—a considerable amount of that sort of thing. I should expect a great deal more than there used to be, although there always was much of it; but in speaking of the fire of ships upon places as distant bombardment and the return fire of forts upon the ships, I think the lecturer has imagined the fire will be lighter than it really will be. I think we should not undertake the bombardment at all unless the target was a pretty good one, and we should fire pretty well for the centre of the target and do as much damage as we could, not being very nice as to whether we wanted to possess ourselves of the place afterwards and make use of it. So also with the tactics of defence. I am sure that as far as our gunnery goes in the Navy we should try to hit the centre of the ship, and I do not know that we could go very much closer into it. I think under the circumstances, unless the conditions were very exceptional, we should simply content ourselves with hitting the ship, and as nearly in the middle as possible. We should fire at the middle as being most likely to hit her somewhere, and I suspect that that would be the case also with forts. I think the lecturer used a golden expression when he pointed out to us that the forts should be fitted to the guns, rather than that the guns should be made to fit the forts. I myself have long had the impression, which I presume is shared in by the lecturer, that there is a slight tendency to suppose that the gun is the secondary business, and that if you get the fort right the gun can be easily fitted to it afterwards. I was struck, having had no experience beyond what I have read about range and position-finding, by the lecturer's remarks upon that question;

they did not seem to bear out what I had generally read about it. He seems to throw some doubt on it, and to say that there are more difficulties in carrying out range and position finding than we had at first imagined. For instance, the smoke passing before the Commander directing the fire of, I presume, many batteries, seems rather awkward, for it is possible that that smoke might interfere with the whole of the fire of the batteries under his control. Also, I am very glad to think that the lecturer has put submarine mines in what I believe is their proper place, as an auxiliary. I fully agree with him that the heavy guns must come first of all—first the heavy guns if you wish to defend a place by heavy guns. Then the mines must come, simply with the object of detaining the ships under the fire of the guns; and thirdly you must have the light guns, and their position must be entirely determined by the position of the mine-field. But there is this always to be borne in mind, that a little mine for ships goes a very long way, that the mere fear of mines—recollecting that you have valuable ships under your feet—the mere fear of losing those ships on the top of those wretched mines will keep you very much off, and therefore you need not suppose that you require anything particularly elaborate. I believe if you were to poll the Navy now it would be said that we should never go into shallow water unless we first ascertained that there were no mines there. That is the first thing to be done. We do not now trust to chance, not so much on account of the danger, but on account of the waste of money it is to lose a ship on the top of a submarine mine. I think the lecturer has struck oil in pointing out—I am not sure that I have heard it before—how effective the locomotive torpedo may be in destroying mine-fields. It may be simply that the thing is newer to me, but I have not that I am aware of heard it distinctly suggested that locomotive torpedoes should be used in that way, but I cannot help thinking that it might be very effective. No doubt the lecturer does not mean it, but the paper reads as if he thought net defence was a defence against some sort of fixed mines, but it is no such defence. No ship would use net defence passing a field of fixed submarine mines of any sort: it is only a defence against locomotive torpedoes, because, as a matter of fact, the net does not cover the bottom: it covers the side only. I think we may say that anchoring depends on the conditions of the case. You would anchor if you found you were not being hit, but if you found you were being hit there would be no anchoring; you would trust to the size of the target you were firing at, and give up the accuracy that you could get by anchoring. I do not think you could lay down any rule about it. The lecturer seems to me to speak truly in declaring that ships will not recklessly charge mine-fields. Although Farragut did it, using the now historical words, "Damn the torpedoes"—although they reported that the "Tecumseh" had just gone down ahead of him, he said, "Damn the torpedoes, full speed ahead." He did it this once undoubtedly, but I question whether we should in any case wilfully charge a mine-field, unless the object to be attained was immensely important and you did not mind losing a ship or two in endeavouring to gain it.

Major WALKER, R.E.: There are a very few words I would like to say with reference to some points in this paper, especially after the very able manner in which Admiral Colomb has discussed it, which has left very little for me to add. There is one statement that I think needs some qualification; the lecturer says: "The arrangement of the defence in such a manner that no fort can be exposed singly to such an attack is, of course, a question of construction in time of peace, and not one of tactics." Now, I think that shows a total misconception of what fortification is. I think that fortification is tactics; you cannot separate fortifications of any kind from tactics. The lecturer says that himself where he states that "a considerable number among us still regard the tactics of coast defence as being a contradiction in terms, owing to the fact that no movement of troops is possible under the conditions of the defensive action of forts." Then he says the idea of movements which has been held necessary as a distinctive feature of tactics is not necessarily a condition of tactics; the mere fact of the forts being immovable does not alter the case in the least; it is just as much a question of tactics in placing your forts beforehand to defend the Channel as it is a question of tactics on the part of the Admiral of the attacking fleet how to arrange the ships for the attack; both things are equally tactics. I think it is absurd to say you can in any way

dissociate fortifications and tactics; all fortification is tactics, nothing more. It is a very common error, I think, to say that fortification is the art of construction, and I am afraid it is a very prevalent error to think that engineering and fortification are synonymous terms. I deny that altogether. In order to build a good fort a man must have (if it is an elaborate construction of iron and stone, such as we have had in times past, but are not likely to have again soon), to erect a construction of that kind successfully, a knowledge of engineering, but he need not have any knowledge of fortification at all. It is merely a question of engineering, and we are too liable to confuse that with fortification, and to confound the two things. Fortification is tactics, and the soul of fortification is the knowledge of tactics, and unless people who design fortifications are acquainted with the tactics of defence and attack they will design bad fortifications, and if the fortifications are good they will have effects, no matter how badly they may be built, within limits. But the questions of building, and of fortification proper—the real soul of the science—are quite distinct, and it is a very great mistake to confuse them. I do not think that is very commonly acknowledged. I have heard it said very lately that there is no special knowledge of fortification possible, everybody is equally well acquainted with the subject; but I think fortification is a science which requires a great deal of study, and for that very reason, that it is tactics, and that it is continually changing in consequence. It is founded upon the arms in use, and unless the men who design fortifications are acquainted with the progress of military science generally they will design bad fortifications. That is the first point I want to draw attention to. Then there is another part of the lecture in which Colonel Walford lays down that “when- ever, owing to the character of the site, or from other causes, several ships can concentrate their fire on a single fort, while the latter, for similar reasons, can receive no assistance from the fire of collateral forts on the ships, the ultimate success of the latter is certain.” I think I agree with Admiral Colomb, that a little fort often goes a long way, and if you take the instance of Fort Fisher, in the American War, you will find there it is not so certain that, even with a powerful squadron all firing upon a single, very weak fort, you will get this very decisive result. What happened at Fort Fisher? They attacked it on two days in December, two successive days: the work was attacked by a very large fleet. On the first occasion they poured in—I am speaking from memory, but I think I am right in saying that the official despatch gives the number as—115 shells per minute for four hours, and on the second day the same fleet went in again and attacked the fort, and poured in 50,000 shells in the space of seven hours. What was the result? The official report made to General Butler was to the effect that the fort was practically uninjured as a defensive work. That shows that the power even of concentrating a very large fire on a single fort does not mean immediately such very decisive results as that paragraph would lead us to suppose, when the fort is efficiently constructed. In that case, though it was a poorly constructed fort, it was efficient for its object, because it was a fort constructed of sand. There is again a question that Colonel Walford asked about the proper place of submarine mines, and he lays down, I think, absolutely correctly the relative importance of guns and mines. He says he asks the question because he has not, up to the present, been able to obtain any information, and he states his conclusion to be, first in importance, the heavy guns, then the mines, then the light guns. I do not think that there has ever been any doubt on that subject, as far as I know. It is admitted by all experts in fortification that submarine mines are only an auxiliary defence. Surely nobody ever imagined that submarine mines alone should be made a defence. I certainly have never seen it. There is one little point as to the attack on submarine mines by torpedoes that, I think, is perhaps worthy of notice. I believe the Zalinski pneumatic gun is looked upon as being likely to give very efficient results in that way; the launching of large charges by that gun, which explode under water, will be a very efficient means of attacking such mines. There is one other little point that Admiral Colomb mentions that I might say a word about, and that is with reference to position-finding. There is very little said about it in the paper; but as to the difficulty about the smoke, I think it is hardly generally understood how little difficulty there is in that particular; efficient position-finding, as we now understand it, will really be conducted at such a distance from the guns that the smoke does not, as a rule, come in

at all. There are particular cases, no doubt, where owing to the difficulties of site the position-finders will have to be in the immediate neighbourhood of guns, but this will be the exception rather than the rule, and I believe, as a rule, the smoke difficulty, which has been mentioned more than once lately in this theatre, will not play any important part in position-finding, and I think it is an undoubted fact that the introduction of position-finding has made a most enormous difference in the question of the possibility of land forts being attacked by ships—a difference altogether in favour of the land forts.

Colonel HAMILTON TOVEY, R.E.: I first of all wish to thank Colonel Walford for his very interesting lecture. As an engineer, I feel especially grateful when we have an opportunity of hearing the opinions of other Officers, and especially of naval and artillery Officers, on this question of the fortifications which it is our duty as engineers to construct. As to the criticisms that Colonel Walford has made as to the position of existing forts, I really think that, considering the changes that have taken place in circumstances, and especially in the arms in use, since these situations were selected, the existing forts cannot be said to have been badly placed at the time when they were built. I think that criticism on this point very often goes too far; it does not allow sufficiently for the fact that the position of sea forts is dictated to a very large extent by the nature of the channel they have to defend. For instance, we hear it constantly said now, and I have heard it said here recently by Officers of my own branch of the Service, that earthworks are now everything, and that it is now quite out of the question to think of building forts of masonry or iron. Now it is obvious that in some situations it is impossible to build earthworks—for instance, at Spithead, or upon any rock or cramped position in the centre of a channel, or any very circumscribed position where it is necessary to mount heavy guns. The only way of providing guns for such a position is to put them in a very concentrated form, and if we had to do that now we should still have, as in the past, to build iron forts. There is another point which I notice in Colonel Walford's lecture. He dwells upon the necessity for placing guns a considerable distance above the water. Now in some situations you cannot do this; for instance, at Portsmouth, where the coast line is only a few feet above the water in the greater part of its extent. With regard to the special part of the lecture to which I would call attention, my hands have been very much strengthened by what Admiral Colomb has said. I have thought over the question a good deal, and I must say I have come to the same conclusion which I understand the Admiral has arrived at, viz., that the attack upon forts by ships will be so very dangerous and difficult, that if the attacking force can possibly avoid direct attack, they will do so. Admiral Colomb suggested that it is almost impossible that our harbours and forts should ever be attacked by an enemy, on account of our always having a superior naval force. Admiral Colomb has lectured on that subject lately, and the discussion has made it very clear that we do not all agree on that point. Many distinguished Officers, naval as well as military, think it by no means an impossibility that our harbours should be attacked. Nevertheless, I am very glad to agree with Admiral Colomb's suggestion, that the question is one which should not be looked upon entirely on one side; we must also consider it as it will affect us when attacking the forts and harbours of our enemies, which appears to me will most certainly be a phase of any war in which we shall be engaged. Looking back to history, we find a great many instances of attacks by British forces on foreign possessions, and in nearly all such cases the attack has been carried out in the way that Admiral Colomb suggests, *i.e.*, by a joint expedition, by the Navy assisted by a large military force, and I cannot help thinking that that is the real kind of attack which is likely to take place, whether on our own forts or by ourselves on the forts of our enemies. This point has, I think, been too much overlooked by our own people in the construction of our most recent fortifications. It may be quite right in defending a harbour to concentrate your strength in the direct channels of approach, to multiply your batteries, and to spread your guns, but I think it is not sufficiently kept in mind that if an enemy has to attack such a harbour, they will not run their heads against such strong defences, if they can possibly avoid it; but if they can land a force along the coast and outflank the defences by an attack in rear, they will certainly do so. If they succeed in doing this, these detached batteries, isolated and

with small power of defence, will very soon fall from blockade, assuming, as we must, that the attacking force will be superior in number to the garrison. That is a special point to which I wished to call attention, the necessity for a strong centre of defence. I would especially thank Colonel Walford for advocating the practising of the offensive and defensive tactics of coast defence in time of peace; there are so many points respecting these tactics which are so utterly unsettled, so difficult to see the exact way to carry it out, and these are impossible to be solved without actual practice in time of peace. I may instance the questions of unity of command, of the organization of forces, of the use of guard-boats in connection with batteries—the latter certainly a point that wants very closely going into—for unless some very definite rule can be laid down, the position of guard-boats in front of batteries during an attack will be a very uncomfortable one. Then there is the absolute necessity for more electrical communication between the forts and between the mine-fields and the central command. Then the question as to the number of electric lights, both for mine-fields and for batteries. All these things require a great deal of care, and although they cannot, for pecuniary reasons, be all supplied at once, we ought to have very definite and exact ideas of what is required, and how it is to be obtained.

Major-General DUNNE, Commanding Chatham District: I think it is to be regretted extremely that the Inspector-General of Fortifications and all his Staff, and also nearly the whole of the Submarine Miners of the Royal Engineers, are engaged at Chatham to-day, and consequently they are deprived of what, I think, will be of great use, *i.e.*, the valuable remarks that have been made on the subject of submarine mining; and we, too, may have lost the benefit of their criticisms on Colonel Walford's paper, in which he may have a little too much minimized the power of submarine mines, while, on the other hand, perhaps Admiral Colomb rather exaggerated their power. I rise merely to say that I think the subject of the lecture would have been better thrashed out if we had had some of the able representatives of the submarine mining party here to-day. I do not myself feel inclined at this late hour to take up the question, especially as I am not a submarine miner.

Colonel WALFORD, in reply: I think the principal remark I have to make is that it has been said that I have passed over some few matters very lightly, while I have not mentioned others at all. I should wish on this matter to draw your attention to the fact that the paper is already too long. I am allowed to speak for only an hour, and I began my paper (and I think I also ended it) by saying I could do nothing more than merely touch on a few introductory points. No one is more anxious than I am that the subject should be ventilated. I believe that no attempt has ever up to the present time been made to do so, and I have read my paper to-day in the hope that, the subject having been once introduced, some one might be tempted to take it up and work it out thoroughly. Admiral Colomb said he thought such tactics of coast defence would not come into practical use until the Empire was moribund; but, I think, a good many artillerymen, now stationed in various Colonies, will feel that we may very possibly be called upon to fight single ships, or small squadrons, even if a combat with a large fleet be out of the question. As to cutting-out tactics, I had time to say no more than they were considerably complicated by the electric light and submarine mines. Admiral Colomb said he thought that we on shore would be content to hit a ship, and would not lay on any special part of that ship. I do not agree with him. My own impression is, and I believe most gunners would agree, that as soon as a ship anchors, and we get a standing target, we shall aim at the heart of the ship, and not at the ship as a whole. As long as the ship is on the move, I think we should attempt no such nicety, but should merely strive to hit the ship somewhere. With regard to the question of torpedo nets, I was aware that net defence was not intended to be used against submarine mines, but I had no other way of expressing what I meant. Possibly it may be in your remembrance that during the war in America some of the ships were rigged out with temporary expedients for clearing away submarine mines, a framework of some kind in front of the bows; it was this to which I wished to refer. Major Walker made what appears to me rather a large statement with regard to the relative positions of fortification and tactics. I

should prefer to say that fortification should be included in tactics, and is perhaps rather a small part of it. I am inclined to think that tactics are so very much larger in their scope than fortification, that it would be more correct to describe fortification as one chapter of tactics.

Major WALKER : I said the soul of fortification was tactics.

Colonel WALFORD : Again, with regard to the position-finder, Major Walker said that in the stations now provided for the position-finders, there would be no question of interruption of the view of the Commanding Officer by smoke. With this I entirely agree ; but I know also many forts where the station provided for the Commanding Officer is absolutely useless, and so dangerous that you would have to provide six or eight reliefs of Commanding Officers. I can call to mind one or two stations where a Commanding Officer would not have a chance of living five minutes under fire, and whence he certainly could not conduct the action at all. I have further only to thank you for your kind attention.

The CHAIRMAN : Gentlemen, I have no intention of entering into any controversy, but as regards one point, whether it is necessary for us to be, or to wait till we are, a moribund Empire, in order to discuss this subject, I am afraid I can hardly agree with Admiral Colomb. I have the honour to serve on the Colonial Defence Committee, and on that Committee I have the priceless advantage of having as one of my colleagues the Director of Naval Intelligence. Before we discuss a question of local defence of any particular point, we, as a rule, have a memorandum drawn up by him as to the nature of naval attack to which this place is liable, and where the matter is at all serious we get the Admiralty's concurrence with that memorandum. So that we have the authoritative statement before us, not only that these places are liable to attack, but that they are liable to a particular nature of attack. Therefore, it seems to me, when we have got to the point where we have an agreement between the Admiralty and the War Office that it is necessary that certain places should be fortified against an attack of an enemy's ships, the one thing above all things we have next to do is to learn how we ought to defend them ; and that, I think, is what we are immensely indebted to Colonel Walford to-day for helping us to study. There are one or two points I would say a word upon. First, as to the question of bombardment at long ranges. Personally I attach very little importance to it, except to its moral effect. I do not believe in it ; and in the instructions which were sent out two or three years ago from the War Office to all the General Officers commanding fortresses at home and abroad, directing them to prepare complete schemes of defence, each one of his own fortress, it was particularly pointed out that the effect of bombardment was in nearly every case more moral than actual upon the public, and that if good arrangements were made for putting out fires, which have been organized in these stations as far as possible in times of peace, no place need submit to pay a forced contribution simply because it is threatened with bombardment at long range. The question of combined attack by land and sea is a very important one. We consider in dealing with the defence of different places that there are different classes of attack : there is the attack by a single cruiser, there is that which the Admiralty recognize as an attack by a small force of cruisers able only to land such parties as they could lend from their crews, and that would be a limited number, a very small number, perhaps 200, 300, or 400 men. Then, directly we get beyond that, we come to the fact that if serious attack is to be made upon any place, it must be made by a combined force of troops and ships, and that means that the naval force going to attack this place must convoy transports ; and I agree with Admiral Colomb that this means having command of the sea, or else it can only be an operation attempted immediately upon the very outbreak of a war from a port very close to the one to be attacked, a risk which might be run for the sake of capturing or destroying a coaling station before a superior hostile fleet could intercept the operation, and that I think is a risk fully recognized at the Admiralty. As to the question of smoke, whether we are ever going to get this smokeless powder it really is difficult to say. I believe great advances are being made in that direction, and if we get a thoroughly good smokeless powder, that will give another additional advantage to the position-finder. But I must say myself I look forward to something beyond the present position-finder. I look forward to this with confidence, and with the most absolute belief and conviction in my mind that at a day not far

distant we are going to have it. I look forward to the time when the motion of the telescope of the position-finder will not merely move hands on a dial in the battery, leaving many elements of human error in existence, such as reading the dial and laying the gun, but when the motion of the telescope will lay the gun directly upon the object. That we shall come to that I have not the slightest doubt. Major Watkin is as convinced that he will arrive at that as I am that he will. When we arrive at that it does seem to me that the fort will have an immense and overwhelming advantage over the ship. We have not got to it yet, but I firmly believe that we shall. There is only one thing more to which I think this lecture points, and points with great force, and that is to the absolute necessity of close co-operation, not only in the study of these subjects, but in the carrying of them out, in the first place between the Artillery and the Engineers, and in the next place between the Army and the Navy. There are naturally (I hardly like to use the word) jealousies, but there are naturally slight conflicting feelings, each, in fact, saying, "There is nothing like leather," and that leads to a very slight feeling of jealousy. The artillerymen may think that they ought to have the electric light and the torpedoes; the engineers may think these are best in their hands; the control of the guard-boats and questions of responsibility for active and passive defence may not be yet thoroughly settled as they ought to be between the Army and Navy, and therefore I venture to think we want some body brought together to discuss these questions, with one heart and one object, the sole object being to decide, not what is best for the Army or the Navy or the Engineers or the Artillery, but what is best for the country; a body able to discuss these matters authoritatively and closely, and to arrive at a clear authoritative system of tactics to which all soldiers and sailors, artillerymen and engineers, ought to work. With these words I will only say I hope I shall carry you with me when I ask you to give a most sincere vote of thanks to Colonel Walford for bringing before us this subject in such an able way—a subject which is more interesting to our nation than perhaps to any other, because we of all nations have the largest sea-board to defend. As Colonel Walford tells us he has only touched on the fringe of this subject, I think you will perhaps agree with me, it would be an excellent thing if he would continue it in another paper at some future time.

Friday, May 31, 1889.

ADMIRAL H. BOYS, Vice-Chairman of the Council, in the Chair.

ON THE MARINER'S COMPASS IN MODERN VESSELS OF WAR.

By Staff-Commander E. W. CREAK, R.N., F.R.S., Superintendent of Compasses at the Admiralty.

It is now seventeen years since the late Captain Sir F. Evans gave his last lecture in this Institution, on the magnetism of iron ships and the treatment of their compasses. It is true that during that period the improvement of the mariner's compass as an instrument of navigation and the means of correcting its errors have been the subject of various papers, but there remains much to be said on the increasing difficulties with which the compass on board modern ships of war is surrounded, and how those difficulties have to be met and overcome.

The Council of this Institution have done me the honour of inviting me to read a paper on this subject, and I have therefore prepared the following remarks commencing from the period of 1872, and in continuation of the paper before referred to. There will, consequently, be no need to enter into the historical portion of the subject, as it has already been so fully treated of in several papers written in England, and also in that excellent introduction to the French translation of the Admiralty Manual of 1870, entitled "*Exposé Historique*," by Lieutenant Collet of the French Navy.

In addressing an audience of my countrymen I need hardly make an effort to arouse a special interest in the subject of the compass in ships-of-war. We should know now—if not from our own conception of what is needful to the national safety—at any rate from the writings and speeches of numerous high authorities, both political and naval, that we must have a large and powerful navy, one part of it consisting of vessels possessing considerable powers of resistance to the effects of modern projectiles combined with high speed; the other part, a more numerous family of small lightly constructed craft of still greater speed and handiness.

This consideration of high speed points to the necessity of providing our ships with compasses of the greatest accuracy with which to navigate them, capable of withstanding severe vibrations of the hull caused by their powerful engines, and shocks from firing heavy guns, while the requirements of a modern war vessel as regards dis-

tribution of the iron and steel armour seem to vie with the previous considerations in rendering the task more and more one of care and judicious treatment. Let us therefore inquire into the various causes of disturbance, mechanical as well as magnetical, and ascertain how far success has been attained in making the compass, in the midst of its numerous enemies, the instrument of precision we would fain have it.

Referring to the paper of 1872, it will be found that after an examination of the magnetic history of a large number of iron vessels of the Fleet combined with the results obtained by the Liverpool Compass Committee, certain definite conclusions were arrived at of which the following are the principal:—

“1. The magnetism of iron ships is distributed according to precise and well determined laws.

“2. That a definite magnetic character is impressed on every iron ship whilst on the building-slip, which is never afterwards entirely lost.

“3. That in an iron-built ship and in that part of her within which the navigating or standard compass is generally placed, the polar force is that from the magnetism of the whole body of the ship, and is nearly uniform; that we cannot escape from the action of that force by any care in the selection of a place for the compass.

“4. That the definite magnetic character of an iron ship, so far as relates to the polar forces developed in her during construction, is shown by the connection which exists between the direction of the ship's original magnetism and the direction of her head when on the building-slip; for the original semicircular deviation consists principally in an attraction of the north point of the compass-needle to the part of the ship that was south (or nearly so) in building.

“5. That a great reduction takes place in the magnetism of an iron ship on first changing her position after launching, and that her magnetism is then unstable for a short period. Then, after a few months' service, perhaps within a year for the average of ships, the time probably depending on the nature of the iron employed in the construction, the magnetism of the ship acquires a very stable character.

“6. That in iron-built ships, as at present constructed, the ship's polar force is generally so great as to make it necessary to employ magnets to equalize the directive force on different azimuths of the ship's head, even at the most carefully selected position.”

Of these the two first conclusions have been fully confirmed by observation up to the present time. Of Nos. 3 and 4 it may be said that they are only so far true, “that we cannot escape from the action of that force (the polar force of the ship) by any care in the selection of a place for the compass;” but however carefully the position of the standard compass may be selected in modern ships, it is very seldom that the polar force at that position “is that from the magnetism of the whole body of the ship.” Not many years ago it was a matter of simple calculation to ascertain approximately the direction in which a ship had been built, if the deviation on two adjacent

cardinal points of the compass were known, showing that the compass was affected by the whole body of the ship. Now, however, from the largely increased use of iron and steel in the shape of superstructures in turret-ships, conning-towers, iron masts, and deck cabins, the deviations observed at a standard position proceed from the hull largely dominated by that of the nearest iron body. For example, the turret-ship "Hecate" was built with her head in a northerly direction, and, according to conclusions 3 and 4, the standard compass needle should have been attracted towards the stern. It was nevertheless attracted towards the bow by a force greatly in excess of the earth's directive force. Again, in the "Dreadnought," built head S.W., the attraction should have been towards the port bow; whereas it was found acting strongly towards the stern, and, as in the former case, by a force greatly in excess of that of the earth. Conclusion 5 may be considered as confirmed by the experience of later years to a great extent, but really before a ship is commissioned she undergoes such lengthened trials under steam at high speed, followed by gun trials, that she may be expected to have assumed a fairly stable magnetic condition, and subsequent changes will occur very slowly, forming no source of anxiety to the navigator.

The following conclusions are the results of a comparatively recent investigation of the deviations of the compass at the standard positions of a number of vessels of different types, which had during their commission traversed large ranges of magnetic latitude during the years 1871-83, and amply confirmed by subsequent results up to the present date.¹ The list includes six armour-plated vessels, four of iron cased with wood, three iron troopships, three iron and steel cased with wood, and seven composite-built vessels. The deviations were not only analyzed according to the usual methods by which the several values of the semicircular and quadrantal components are ascertained, but the semicircular deviations were subjected to a further analysis, showing how much was due to hard and soft iron, or to iron of a character intermediate between what is known, magnetically speaking, as "hard" and "soft" iron. Always remembering that the observations were made at standard positions carefully selected as the best available in each ship, the following conclusions were arrived at:—

"1. A large proportion of the semicircular deviation is due to permanent magnetism in hard iron."

"2. A large proportion of the semicircular deviation may be reduced to zero, or corrected for all magnetic latitudes, by fixing a hard steel bar magnet or magnets in the compass pillar in opposition to, and of equal force to, the forces producing that deviation."

"3. A very small proportion of the semicircular deviation is due to sub-permanent magnetism, which diminishes slowly by lapse of time."

"4. The sub-permanent magnetism produces deviation in the same direction as the permanent magnetism in hard iron, except when temporarily disturbed, (1) by the ship's remaining in a constant position

¹ See "Phil. Trans. Roy. Soc.," 1883, Part II, p. 615, *et seq.*

with respect to the magnetic meridian for several days, (2) by concussions, (3) or by both combined, when the disturbance is intensified."

"5. To ascertain the full values of the changes in the sub-permanent magnetism, observations should be taken immediately on removal of the inducing cause."

"6. In the usual place of the standard compass, the deviation caused by transient vertical induction in soft iron is small, and of the same value (nearly) for ships of similar construction."

"7. The preceding conclusions point to the conditions which should govern the selection of a suitable position for the standard compass with regard to surrounding iron in the ship."

Now the establishment of conclusions 1 and 2 was very important, for it showed that the principal part of the magnetism of armoured ships like the ordinary iron ship was nearly all permanent, and could be corrected once for all by permanent magnets, instead of "the amount of the induced and permanent magnetism" being "nearly equal," as was supposed in 1872—conditions which would have necessitated either the acceptance of a constantly changing deviation as the ship proceeded from high to low magnetic dip in one hemisphere, and *vice versa*, or the constant alteration of the correcting magnets as well as the application of a large Flinders' bar. One instance of the latter complicated state of things in the case of a Sir William Thomson's compass, placed, for convenience of handling the ship, forward, abaft the director-room of the "Agamemnon," may serve to illustrate. When that vessel proceeded from Colombo to the Mediterranean, although 4 feet of Flinders' bar were fixed to the binnacle, the magnets required to be constantly changed to keep the compass errors within moderate limits. Here the changing part of the semicircular deviation due to vertical induction in vertical soft iron, varying as the tangent of the dip, was largely in excess of that due to hard iron. On the other hand, the "Impérieuse" has been to the Cape and then to Hong Kong with less change than many an old wooden ship.

Conclusions 3, 4, and 5 may be discussed together, as they all refer to the sub-permanent magnetism of the ships. But first let us pause to consider for a moment the exact definition of sub-permanent magnetism as used here. As already stated, a large portion of the semicircular deviation at the standard positions of our ships has been found to be due to permanent magnetism in hard iron, a small portion of it and the quadrantal deviation being due to the soft iron of the ship taking up and parting with its magnetism very rapidly. Intermediate between this strictly hard and soft iron, and, fortunately, not evident in large quantities, there is found in every ship iron showing for a time the characteristics of hard iron, in causing polar deviations in the compass. It is, however, constantly liable to lose this polarity, either by lapse of time after the removal of the inducing cause, or its polarity may be reduced to zero, or totally reversed instantly by shocks inflicted on the general structure of the ship. The amount of deviation produced by iron of this nature has been found to vary for each ship, and to range from 1° to 6° or 7° ; a great deal depending upon the proximity to the compass of the surrounding iron.

Now, no suitable corrector has as yet been found for deviations of this kind, and the only course open is that of constant observation and careful notation of the results for immediate and future use.

As vessels of war are specially under consideration, I would lay stress on the effects of firing heavy guns with the ship's head in one direction. Sometimes the violent shocks which the ship receives alter considerably the direction of the pull of the sub-permanent magnetism of the ship on the compass. The change gradually decreases in amount, occupying from a month or six weeks to a few days in returning to its normal condition. Considerable success in obviating these changes has been obtained by firing with the ship's head in various directions. For example, when simultaneous broadsides of five 13-ton guns were fired from the "Bellerophon" off Plymouth in 1886, with the ship's head in opposite directions, there was no change of deviation. Other instances might be quoted in support of this.

On conclusion 6, I would remark that up to the present time, the deviation caused by transient vertical induction in vertical soft iron continues to be of moderate amounts at standard positions in most of our ships—a very desirable result, considering that the use of correctors should be avoided when possible.

In dismissing that part of the subject relating to semicircular deviation, it may be said that, if sufficient care is exercised in preparing a place for the standard compass, experience shows that in modern war-ships the semicircular deviation is generally either of moderate amount, or of such a character that it can be corrected for all latitudes. Much may be done in a similar direction for the steering compasses, which are not very near thick vertical armour.

The vessels which have been thus treated of, have always been considered to be upright, or on "even beam," as it has been aptly termed, and there are still certain difficulties to be overcome before we can navigate them safely by the compass. I allude more particularly to the diminution of the mean directive force acting on the compasses at the protected positions on board our modern armour-plated and armour-decked ships, the large values of the quadrantal deviation, the great increase of their heeling errors, and the evil effects of swinging ships other than very slowly in one direction, either to starboard or to port.

Before, however, considering these difficulties, I think my reasons for thus accentuating them so strongly should be given, especially as at standard positions we are able to fairly sustain the conditions of twenty years ago; and no untoward result to navigation has happened during that time, depending in any way upon low directive force, or quadrantal deviation. I believe I am fully supported by many leading Officers of the day in the opinion, that compasses successfully placed in conning-towers and other protected places, so as to be nearly correct in showing the direction of the ship's head, and as a consequence the arc of the horizon through which the ship's head may be turned, are of the greatest importance. Compasses in our well-placed standard positions with closely corrected auxiliary compasses on chart-houses and bridges, from which all-round views

may be had, are all very well for taking the ship to the scene of action or for concerted manœuvres of the fleet without an enemy in sight; but I do not think I detract from British pluck when I say that in face of an enemy within range well provided with quick-firing and machine-guns, the Officer who went to observe at these exposed positions would, besides probably finding the compass *hors de combat*, seriously endanger a valuable life far more useful elsewhere.

On the Diminution of the Mean Directive Force to North acting on the Compass Needle.

It has been thought by many persons that as long as a position could be found in a ship where the deviations were moderate, or could be nearly corrected, such conditions were satisfactory for a compass used in navigating the ship. This idea is most illusory and even dangerous in its consequences, as it is easy to conceive a position where there may be no deviation, and yet the directive force is so low that the compass is not only very sluggish in action, but is liable to the effects of every temporary change in the magnetism in the surrounding iron, and all its mechanical defects are rendered doubly apparent. The following table gives the values of the mean horizontal directive force to north, or λ according to the notation of the Admiralty Manual, on board two of our modern belted cruisers, considering the earth's horizontal force = 1.0. In six of our battle ships the λ at their standard positions varied from 0.800 to 0.855, which may be taken as common values for that class of ship.

Ship's name.	Standard.	Bridge.	Conning-tower.	Fore torpedo-flat.	Steam steering aft.
"Orlando".....	0.762	0.616	0.212	0.660	0.720
"Undaunted".....	0.822	0.618	0.243	..	..

It will be seen by these figures that whilst as a rule 0.8 of the earth's directive force remains intact at the standard positions, only a little over 0.6 is found at the bridge compasses of the "Orlando" and "Undaunted." These latter compasses were placed on the fore bridge for convenience of steering as well as for taking bearings when the ship is going in and out of harbour, and other pilotage waters. They are secured in positions 6 feet above the conning-tower which acts as a gigantic Flinders' bar below it. Descending to the conning-tower, where the compasses are placed in the most advantageous position near the centre, the mean directive force is found to be only 0.212 and 0.243 respectively, or a diminution of rather more than three-fourths as compared with a position on shore. Thus a conning-tower with a plating of 12" thick and two-thirds of that thickness

very soft iron as in the two ships mentioned, is about as bad a place as possible for a compass even when nearly corrected.

On the Quadrantal Deviation.

As long as the quadrantal deviation at any compass is not more than 8° , it may be considered as within manageable limits either for correction by soft iron or to be left for tabular correction. At standard positions in eight typical battle-ships, the quadrantal deviation varied between 5° and $8^{\circ} 30'$; but it is when the protected positions are examined, that the difficulties arise, for then we have generally a combination of limited space and large values of this deviation.

Table of Quadrantal Deviation, or Coefficient D.

Ship's name.	Bridge.	Conning-tower.	Fore torpedo-flat.	After steam steering.
"Orlando"	+4° 54'	+16° 9'	+18° 56'	+25° 38'
"Undaunted"	+4 7	+16 0	..	..
"Collingwood" .....	..	..	..	+20 30
"Dreadnought" .....	..	..	..	+21 0

The figures in the table show what is commonly found in protected positions, and they convey the certain information that compasses with such errors, combined with low directive force, are of little use unless closely corrected. How this is to be done will be fully considered towards the close. The attempt was made to correct the 10-inch Thomson compass at the armour-cross of the "Agamemnon," only 12-inch spheres being used on account of the cramped space available, but large and most inconvenient quadrantal deviations of 16° remained uncorrected, and the result was an undesirable compass for manœuvring purposes. Great efforts were made to correct a Thomson compass outside the conning-tower of the "Polyphemus," but they were unsuccessful, and the remaining deviations are constantly changing from the compass being so close to the iron. The only means to obtain anything like successful working, is to place the compass near the centre of the tower, for experiment has shown how futile it is to place it near the sides. Two instances when the compass was placed very near the sides of the tower will suffice to illustrate this: (1.) The "Curlew," lying N. by W. On visiting the tower the movable top was lowered to its full extent, the compass, a 6-inch Thomson, pointed to S.E., the top raised 2 inches, it settled at N.E., raised to 4 inches it showed N. by W.; in fact it was hard to make the compass point in any northerly direction at all. The correcting spheres too, became so strongly magnetized by induction from the tower that they had to be re-

moved as mischievously increasing the errors. (2.) In another tower in the "Conqueror," merely raising the small shutters to look out, altered the Thomson compass inside three points. It is therefore incumbent upon Officers in these ships to see that the movable top of the towers should only be raised to one determined height, if the compass inside and that above it, are to be of use.

On the Heeling Error.

As long as iron and armour-plated vessels were liable to heel under sail, the uncorrected heeling error was often a source of trouble, if not of danger to the navigator; especially if the ship were first on one tack and then on the other. With the sail-less ships of to-day, these conditions no longer exist, but the uncorrected heeling error has still a disturbing effect on the compass when the ship rolls, sometimes producing considerable oscillation of the card, or if that be apparently steady, an uncertainty in its pointing. As regards standard compass positions, the heeling coefficients have much the same values as in ships of twenty years ago, seldom exceeding $1\frac{1}{2}^{\circ}$, often much less, and quite within the limits of easy correction. As with the two other coefficients λ and D , with which the heeling error is closely connected, it is when we approach the conning-towers and other protected places, that abnormal results follow. I do not think I can place the subject more clearly before you, than by giving the details of experiments made last year, when the belted cruizer "Orlando" was actually inclined, and the results of a subsequent series of observations made during her voyage to King George's Sound. This vessel, lying with her head magnetic south in Keyham Basin, was inclined 5° to starboard, and 5° to port, the ship's head by all compasses being noted for each degree as the vessel heeled over. The usual observations of vertical force were also made when the ship was upright. The calculated results from the force observations, and those from actual heel are shown in the table. Their agreement is not as close in all cases as I had hoped, but I do not think the late Mr. Archibald Smith, who gave the formula, expected it to be put to so severe a test. It is nevertheless a boon to possess so ready a means of obtaining approximate values without inclining the ship—a formidable task for every ship of the Navy.

The Navigating Officer of the "Orlando" was furnished with the usual instruments for observing the horizontal and vertical forces, and he sent into office observations for Colombo and King George's Sound. These have now been discussed with the following resulting table of heeling coefficients, in which those from actually inclining the ship are noted in italics:—

	Standard.	Bridge.	Conning-tower.	Fore torpedo-flat.	After steam steering-wheel.
Devonport. {	+1° 42'	+3° 28'	-0° 32'	-1° 15'	-1° 11'
	+1 10	+2 50	-0 36	-1 36	-0 40
Colombo	-0 36	-0 5	-1 47	-0 44	-0 38
King George's Sound.	-1 14	-3 14	-6 17	-1 30	-1 13

To take one example—the above figures show that at the bridge compass when the ship heeled over 10°, on a north or south point, the heeling error would be about three points to the high side in England, and about three points to low side in Australia—a change of six points if not kept frequently corrected by magnets at different positions during the voyage.

The next table shows the relative portions of soft and hard iron in the vertical force of the ship, which is the principal element in producing the heeling error, k representing soft iron, and R , hard iron; and the vertical force in England being taken as 1·0. R may be corrected for all latitudes by a permanent magnet placed vertically under the compass; k should, according to the law that “like cures like,” be corrected by a vertical soft iron bar. It is, however, more convenient to use a permanent magnet vertically *below* the compass, and alter its distance therefrom as necessary.

	k .	R .
Standard	+0·136	+0·039
Bridge	+0·419	+0·019
Conning-tower	-0·557	-0·318
Fore torpedo-flat	-0·474	-0·414
Steam steering aft ..	-0·545	-0·387

Note.—The sign + denotes a downward force, the sign - an upward.

At the bridge compass raised 6 feet above the conning-tower the heeling coefficient is shown to be abnormally large and changeable in character from its being almost entirely due to vertical induction in soft iron, the value of k being +0·419, of R only +0·019, which, added to the constantly changing deviation from the horizontal forces, makes the position one to be carefully avoided, except for steering purposes. It is true that as long as the vessel remained in one magnetic latitude, a compass in such a position might be kept with errors of a moderate amount, but the “Orlando” is a vessel intended for possible rapid changes of magnetic latitude, and it would therefore prove a very uncertain compass to trust to. There was, however, a standard position in this ship as usual, where the compass appears to have remained constant in its deviation beyond expectation.

Inside the conning-tower no heeling error of large amount was observed until the vessel reached south dip, and at King George's Sound, it assumed the unprecedented value, as far as I am aware, of about five points for 10 degrees of heel.

At the other protected positions below, the heeling errors proved more constant than at the standard, and capable of easy correction by a magnet.

Taking a general view of the results in the table, it may be remarked, that thick armour plating appears to be the chief cause of difficulty when dealing with a compass, as magnetically speaking it is almost entirely composed of soft iron, seriously reducing the directive force on the needle whilst producing large deviations of a constantly changing character.

On Electric Lighting of Vessels.

When everything has been done by carefully placing the compass, removing all the iron possible from its vicinity, and applying the necessary correctors, there still remains another source of danger to its successful working to be guarded against, which has arisen from the introduction of the electric light on board ship. Fortunately, experiment has now shown that with a well-designed installation, all trouble may be avoided, but I think it would be a want in the present paper if the results of experiments, and the sources of danger which have been discovered, were left untold.

The two causes of disturbance are the dynamo and single wire leads. Thus, experiments on board the "Euphrates" showed that the polarity of an Edison machine affected a compass at a distance of over 40 feet, and instances of disturbance from the dynamo in other vessels have been observed. Of the effects of single wires, an experiment on board the "Royalist" may be cited. One wire was lead under the standard compass at a distance of 13 feet, the return wire was separated only 5 feet from it. With a current of about 100 ampères, a deflection of 8° was observed in the compass, which proved an excellent galvanometer, the deflection increasing and decreasing for every variation of the current without oscillation. In our present state of knowledge, the prudent course appears to be to avoid the use of dynamos of large external field, to keep these machines at least 35 feet from the compass, and to take care, as far as possible, that both poles of the machine be at equal distances from the compass. It has been thought that iron bulkheads and decks would so alter the direction of the external lines of magnetic force of the machine that they would act as screens. This suggestion has not been borne out by experience and suitable magnetic screens have yet to be devised.

As regards the wires, the use of single wires with hull as return is to be deprecated, and the lead and return wires should be kept close together and carefully insulated.

I have used the expression "our present state of knowledge" in order to avoid any appearance of wishing to give a law for a matter

connected with electricity, a branch of science which moves onward at so rapid a pace.

On the Effects of Swinging Iron Ships only in one Direction.

I am not aware of a better means of illustrating the effects of swinging iron ships otherwise than very slowly in one direction, than that of bringing before you some of the results of a series of observations made on board the "Inflexible" in 1882. The compasses used were the Admiralty standard in one position, and a Sir W. Thomson's compass in another; the observations being made by the azimuth instrument of each compass, so that no errors due to comparing one compass with the other could creep in. It was generally found, that when the ship was swung opposite ways, to starboard and to port, on the same day, there was often a difference of at least 2° in the deviation for each direction of the ship's head at both positions. As much as 4° between the swinging to starboard and to port was found at a compass, when the surrounding iron was near and unsymmetrically distributed. The series of deviation tables from the "Inflexible" are very instructive, and form a valuable record of scientific and practical interest. The ship appears to have been swung in the usual manner as regards time, but it is evident that a vessel with such thickly-armoured decks and sides, and iron so close to the various compasses, must either be swung very slowly and steadied on each point, so as to allow the iron not strictly "soft" to take up the proper amount of magnetism due to the direction of the ship's head, or she must be swung opposite ways, and a mean result taken for the correct deviation. It should be borne in mind that the case of the "Inflexible" is one amongst many others, and the lesson to be learnt is applicable to all iron vessels of the present day.

The Disturbance of the Compass on approach to certain Shores.

The mariner's compass has yet another enemy to contend with in the magnetic disturbance caused by proximity to land. This reported disturbing effect is not now brought forward as a novelty, in fact it is an old story often told and discredited by many whose opinions were well worthy of consideration. Well authenticated reports of recent years show that both those who doubted and those who reported were both partly right and partly wrong. The facts are these: it is seldom, if ever, that the visible land disturbs the compasses of a ship, as her distance from the shore would almost in every case entirely keep her out of its magnetic influence. It is the submerged land near the ship's bottom which, possessed of magnetic properties, sometimes of attraction, sometimes of repulsion, produces the observed effects on the north point of the compass.

Now, I have brought this part of the subject forward, in order to place a clearly proved fact on a proper basis, and not with the view of alarming the seaman. We have now a list of localities, situated in different parts of the world, where the disturbance of the compass has

been noted by trustworthy observers, and I would raise a note of warning to navigators, prone to shave corners on a dark night, guiding their ships solely by the compass, that the rocks they approach with ample water over for the ship to float and be safe, may be so strongly magnetic as to deflect the compass, carrying the ship into serious danger if not destruction.

Observations tend to show that magnetic rocks in the northern hemisphere attract the north end of the needle, and therefore a ship nearing the land in moderate depths of water, say under twenty fathoms, on northerly courses, would be drawn nearer and nearer to them. In the southern hemisphere the converse appears to hold good, the north end of the needle being generally repelled, and a ship steering on southerly courses might be liable to close the land without her Officers knowing anything about it. There is no need here to enlarge upon the results of an iron ship's merely touching the ground, much less striking on a rocky bottom. Two well-established examples of disturbing localities will help to illustrate the foregoing remarks, which are the outcome of considerable inquiry.

The first is the case of our surveying vessel "Meda" at Cossack in North Australia. Here, with the visible land three miles off, the "Meda," running on a transit of two objects on shore, in 8 fathoms of water, had her compass steadily deflected 30° for a quarter of an hour during which she sailed over a mile.

The next instance is that furnished by observations of the variation of the compass on the East Coast of Madagascar. The normal lines of the variation for several miles of the coast from St. Mary's Isle southward should vary from about 11° W. to 12° W., but instead of this the French men-of-war, which are frequently running up and down this part of the coast, find that the variation near the shore at St. Mary's Isle is only 6° or 7° W. and 12° W. at $80'$ south, the north end of the compass being repelled by the magnetic properties of the bottom. These results are analogous with those of observations on shore in Madagascar, New Zealand, and other places.

On the Magnetic Character of Torpedo-boats.

As torpedo-boats are an entirely novel form of fighting vessel, introduced since the paper of 1872, a few remarks on their magnetic character may be acceptable.

It may be said at once, that with the standard positions there is every reason to be as fully satisfied as with those of any other iron vessel. The semicircular deviation seldom exceeds 12° or 14° , the quadrantal is generally $+4^\circ$, and the mean directive force is satisfactory. The compass, therefore, is easily corrected by magnets and soft iron; the small remaining deviations of about 2° being fairly permanent in spite of the constant vibrations to which the boats' hulls are subjected. The steering compasses have generally to be placed near the sides of the turrets with semicircular deviations of some 30° or 40° , the maximum of quadrantal deviation being sometimes 8° or 10° , at others 3° or 4° ; but this is a subject which is

receiving attention, with a view to placing the compasses in more satisfactory positions.

Modern Systems of Correcting the Deviations of the Compass.

Very little has been said as yet on the question of correcting the errors of the compass, but the readers of the Journal of this Institution will remember how fully Sir William Thomson described the manner in which he had applied Sir G. Airy's system of correctors to his patent compass, as well as the Flinders' bar.¹ Subsequently to this, in the Journal for 1882, there is a paper by myself, "On Compass Correction in Iron Ships." I, therefore, propose to confine my remarks to the latest phase of the question.

It is commonly remarked, that either a compass is sluggish and will not move, or that it is excellent and moves directly the ship's head moves. Now the ideal compass on board ship is one in which the card refuses to move at all, and steadily and strongly points to magnetic north while the ship and compass bowl turn round it as required by those in command. It should have no work to do in the shape of turning to starboard or port, to bow or stern, in obedience to the magnetic forces existing in the ship, and the directive force of the earth should be interfered with as little as possible. How far the compasses on board our iron and armour-plated vessels fall short of this ideal is shown by their deviations, which, at best, are but reduced to a small amount for a given time and place, whilst constancy of deviation may be said, as yet, to be unattainable.

The reason is obvious: the correctors we use are constant in their action, whilst a portion of the magnetic forces they are intended to oppose is for the most part variable in amount and direction. With well-placed compasses there should be no difficulty in reducing the deviations to a minimum amount of 2° or 3° , subject to changes from firing heavy guns and running for some time on one course; it is when we come to conning-towers and other protected places that trouble arises, first in making the correction and afterwards maintaining it. Our difficulties lie in the correction of large quadrantal deviations ranging from 12° to 30° , and increasing the low directive force. The polar deviations must be left to the care of the magnets, but let us inquire what can be done for the quadrantal.

Beginning with the best form of Sir W. Thomson's compass—the 10"—and supposing that the "Orlando," as a typical ship which we know so well, is provided with them on the bridge, in the conning-tower, and the two protected stations below, what happens? At the same time bear in mind that Sir W. Thomson lays special stress on the close correction of his compasses, for he naturally wishes them to be like the ideal compass just mentioned and inexorably point to the north.

At the bridge compass the quadrantal deviation is only about 5° , and can be readily corrected by a pair of 7" spheres, which also help to correct about 44' of heeling error for every degree of heel on

¹ See papers of February, 1878, and May, 1880.

the north and south points till the first 5° of heel are reached, but gradually decreasing in their power as correctors as the ship inclines further. Inside the conning-tower, the quadrantal deviation is a little over 16° , requiring a pair of $18''$ spheres to correct it. These spheres add about $1\frac{3}{4}^\circ$ of heeling error for every degree of heel.

On the fore torpedo-flats the quadrantal deviation is 19° , requiring correcting spheres of $20''$ diameter, and adding largely to the heeling error which might otherwise be kept nearly correct in all latitudes by a permanent magnet.

At the after steam steering wheel the 26° of quadrantal deviation must have at least $24''$ spheres, again adding largely to the otherwise moderate heeling error.

Again, the effect of spheres is to reduce the directive force on north and south courses, and to increase it on east and west, their general effect being to slightly increase the mean directive force to north on the compass, to correct the quadrantal deviation, and to introduce heeling errors sometimes of a beneficial order, but in some cases producing adverse complications.

In positions below such as we have considered, and specially in conning-towers, the great size of the spheres required for accurate correction makes their use almost prohibitive, and in many ships there is no room even for the moderate sizes. Moreover, we have seen that the directive force is so low that one instinctively inquires why cannot these large deviations be corrected by some system which requires small space, say, within a circle of 20 inches, and at the same time sensibly increases the directive force which is so sorely needed?

By reducing the size of the compass somewhat, I have reason to believe these objects may be attained, and the compass card may be given needles of great directive force, which, instead of being a hindrance to correction, are a benefit.

In order to possess clear views of the quadrantal corrector I am about to describe, a short explanation of the principles upon which it is based seems necessary.

The well-known example of soft iron rods, placed in a horizontal plane passing through the needles of a compass, will help towards this



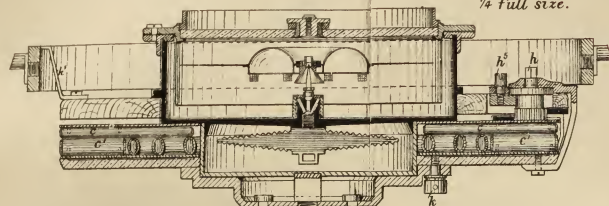
FIG. 1.

FIG. 2.

FIG. 3.

SECTION OF COMPASS FITTED WITH THE PEICHL QUADRANTAL CORRECTOR

$\frac{1}{4}$ full size.



h^1 CLAMPING SCREW.

h SCREW FOR D MACHINERY.

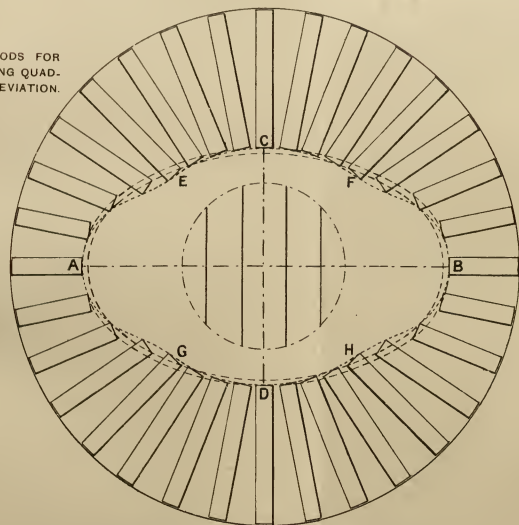
k CLAMPING SCREW FOR SETTING THE QUADRANTAL CORRECTOR FOR OBLIQUE DEVIATIONS $\pm E$.

k^1 INDEX FOR THE CORRECTION OF $\pm E$.

c SOFT IRON CORRECTING ROD OF UPPER SET OF RODS.

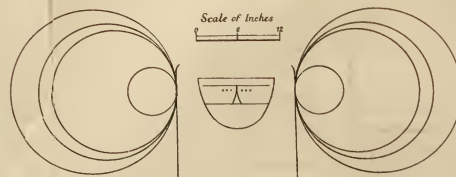
c^1 SOFT IRON CORRECTING ROD OF LOWER SET OF RODS.

PLAN OF RODS FOR
CORRECTING QUAD-
RANTAL DEVIATION.



THE CURVE A E C F B H D G, WHICH SHOWS OCTANTAL DEVIATIONS FROM AN ELLIPTICAL CURVE SERVES TO CORRECT BESIDES THE QUADRANTAL DEVIATION ALSO THE OCTANTAL ERROR.

SPHERICAL QUADRANTAL CORRECTORS FIXED TO BINNACLE TO CORRECT VALUES OF D IN ORLANDO.



Figs. 4, 5, 6, 7, 8, 9 are not drawn to scale.

Fig. 4.

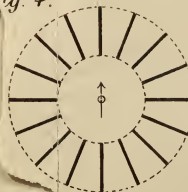


Fig. 5.

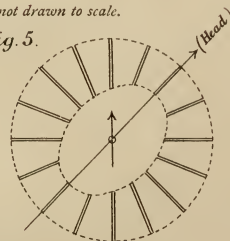


Fig. 6.

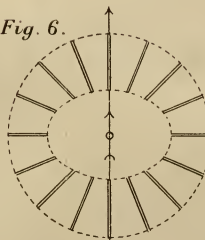


Fig. 7.

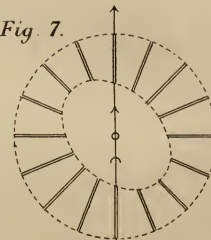


Fig. 8.

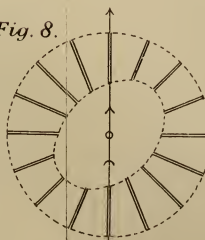
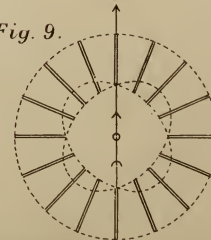
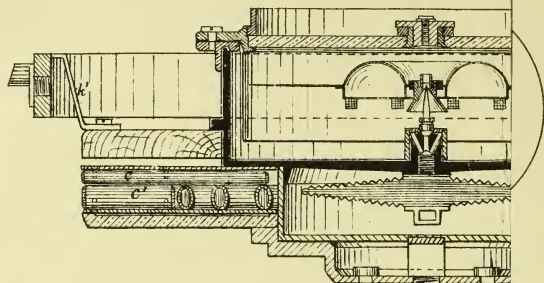


Fig. 9.



SECTION OF COMPASS FITTED WITH THE PEICHL



h^s CLAMPING SCREW.

h SCREW FOR D MACHINERY.

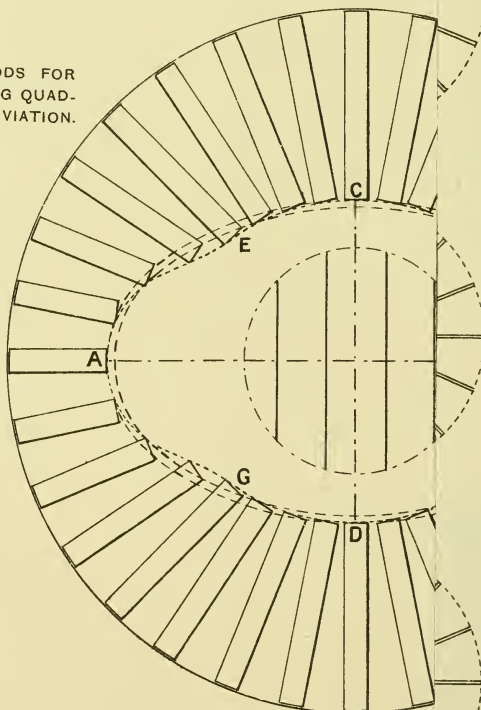
h' CLAMPING SCREW FOR SETTING THE, QUADRANTAL CORRE

h^1 INDEX FOR THE CORRECTION OF $\pm E$.

c SOFT IRON CORRECTING ROD OF UPPER SET OF RODS.

c^1 SOFT IRON CORRECTING ROD OF LOWER SET OF RODS.

PLAN OF RODS FOR
CORRECTING QUAD-
RANTAL DEVIATION.



THE CURVE A E C F B H D G, WH
DEVIATIONS FROM AN ELLIPTICAL CI
CORRECT BESIDES THE QUADRANT
ALSO THE OCTANTAL ER

purpose. Thus, in Fig. 1, the equal rods *increase* the directive force but produce no deviation. In Fig. 2 the equal rods *decrease* the directive force but produce no deviation. In Fig. 3 the transverse rod is much longer than the longitudinal, and the deviation of the compass is caused as well as loss of directive force. It is soft iron, represented by rods of the type Fig. 3, which produces the low directive force combined with large quadrantal deviation on board ship. Therefore, reasoning from the effects of the rods in Figs. 1 and 3, we have only to place round the compass soft iron rods of the type Fig. 1, but of different lengths, so as to counteract the forces of the unequal and detrimental iron of the type Fig. 3. This solution of the difficulty of correction has been most cleverly worked out by the Chevalier Peichl of the Austro-Hungarian Navy, and a compass with corrector, invented and patented by that Officer (see Plate), lies before you on the table; but as the system of soft iron rods is concealed by the woodwork, reference must be had to the diagrams for explanation. I may remark here that this corrector has been adopted for five years in the Austro-Hungarian Navy with great success.

Using the notation of the Admiralty Manual which is now common to the world, the parts of the quadrantal deviation are known as coefficients D and E . The following is a translation of the inventor's description of the instrument:—

“The quadrantal corrector forms the principal part of the instrument in question. The action of this corrector is easily derived from the following considerations: an arrangement of perfectly soft iron rods, and of equal dimensions, disposed radially round a compass at equal distances from the card (Fig. 4), can produce no other effect than that of increasing the directive force, for then it is only a multiplier of intensity. But if, on the contrary, these rods were no longer equal in such a manner that their interior ends form an ellipse (Fig. 5), of which the major axis is parallel to the keel, that different arrangement will produce a multiplier of intensity which at the same time will be capable of compensating a given value of the positive quadrantal deviation, since it produces a negative D . In the positions of this arrangement shown by Figs. 6, 7, and 8, the effects are $+D$, $+E$, $-E$; and in the intermediate positions, the relative portions of D and E will result. Now the quadrantal corrector consists of two sets or systems of soft iron rods placed one above the other, and movable in opposite directions round the compass bowl. Fig. 9 represents their position when the index is at zero. One sees by that that they produce $+E$ and $-E$, and that consequently their total effect in that position is *nil*. By turning them in the direction indicated by the arrows, the position will be reached when the major axes of the two ellipses are parallel to the keel. This is the position of their maximum effect, and it is marked on the index as 1.0 . The value of this maximum effect depends upon the details in the construction of the instrument, that is to say, on the length of the bars, and the distance of their interior ends from the card respectively with the form of the ellipse.”

The action of this corrector is due especially to the induction of

the compass needles in the soft iron rods. This necessitates an adjustment of the corrector on change of latitude, for which an index and scale are provided for all latitudes, and is of a very simple nature.

“This quadrantal corrector produces an increase of directive force for every direction of the ship's head.”

I have experimented with this instrument in the conning-tower of the “Medusa,” and I found I could correct 30° of quadrantal deviation for all latitudes, and for the coasts of the United Kingdom about 44° . These advantages, coupled with the increase of directive force on all azimuths, and the small space occupied, have led me to hope that this instrument will meet a deficiency in our present compass equipment. Before concluding the description of this corrector, I may point out another valuable property connected with it. As the ship proceeds to parts of the world such as Quebec and the St. Lawrence, where the horizontal force of the earth is smaller than in England, so the directive force of the instrument increases, making the compass point with greater energy than with any other system.

In a paper read last month at the Institute of Naval Architects, Mr. W. W. Rundell, who may be styled one of the fathers in compass matters, discussed the question of correcting certain compass errors caused by iron unsymmetrically placed near a compass. His arguments tend to show that these errors are such as would be produced by one horizontal and one vertical bar of soft iron unsymmetrically placed, and that the corrector should be an inclined bar of soft iron, the position of which is to be found from an analysis of the observed deviations. I am testing his propositions experimentally, but am not yet in a position to give an opinion upon them.

General Observations.

Every now and then it is reported that the mariner's compass which has served the navigator on the ocean and the traveller in the trackless forest so faithfully for hundreds of years is about to be superseded by an instrument which shall always show the true north. The idea is captivating, and its realization would be a boon when we call to mind what has been said of the compass in ships of war. Such an instrument therefore must be independent of all magnetic influences. It is true that in 1852 Léon Foucault showed that the gyroscope takes up a direction parallel to the earth's axis. Foucault writes: “Then without the help of any astronomical observations the rotation of a body at the surface of the earth suffices to indicate the plane of the meridian.” Sir W. Thomson, at a meeting of the British Association in 1883, also described a form of gyroscope, which, when rapidly rotated, showed distinctly the direction of the true meridian.

The question as to the motor of such an instrument, which should at once be automatic and continuous, has not yet been answered, and I think we shall for the present do wisely in treating the compass fairly, knowing full well that the earth's magnetic force is ever present to direct it.

The words "Mariner's Compass" cover a great variety of means for utilizing the one great principle of the earth's directive force, in the shape of a large number of compasses patented and otherwise. Finality has not been reached by any one of them, nor is it likely to be. Still we must always feel grateful to inventors for the many valuable aids they have provided for safe navigation; but those who have to report on inventions, and have the good of the Service at heart combined with due economy, must always be on their guard, remembering that they have to deal with individuals often pleasant, persuasive, persistent, and perceptive of everything but possible faults in their inventions. Amongst the many patents, I will only mention Sir W. Thomson's compass, the valuable qualities of which under certain conditions are so well known and require no special notice here.

There is another compass to which I would draw attention, and that is the liquid compass, which, if properly constructed, is one of the most generally useful instruments of navigation yet made. In torpedo-boats, and some of the latest types of fast cruiser steaming under forced draught, the liquid compass has acted well when every other compass failed to a serious extent or was practically unserviceable. It has been in general use in the United States Navy for many years, and in their official book of "Notes on Chronometers, Compasses," &c., the following occurs: "It may then fairly be concluded that the United States Navy is possessed of a compass unsurpassed in its essential qualities by those in other services whether naval or mercantile."

It is used universally in the Austrian and German Navies, and also as a standard compass in the Italian Navy, I, therefore, say without hesitation, apart from such witnesses to its value, that we must hold fast to such a friend in need as it has lately proved, doing all that is possible to perfect it as a part of the necessary equipment.

As to the placing and correction of compasses in our vessels of whatever type, the departments at the Admiralty are working heartily together. The Controller of the Navy, at the request of the Hydrographer, has lately issued revised instructions to meet the requirements of the day, with a view to providing as suitable places for all compasses as the fighting necessities of a war-ship will permit. With the sources of error thus eliminated as far as may be, the work of providing suitable compasses and correctors is a constant subject of earnest enquiry in the department to which I have the honour to belong, and the strength or weakness of the several compass positions is fully proved.

It is not necessary to ascertain the magnetic character of every ship as has been done in the "Orlando" and "Undaunted," as a number of ships of one class or type are generally built, and the full knowledge of one or at most two of each type furnishes all the most useful and necessary data for the rest.

The care thus bestowed is none too much, although it is sometimes asserted that correctors can do anything—and, lest a good way should come to be evil spoken of, I will quote a few lines from a work pub-

lished by the United States Bureau of Navigation after they had made a searching inquiry into the subject of compass errors, and their treatment in iron and steel ships:—

“From all that precedes, it will readily be inferred that to place a compass where the magnetism of the ship will least affect it, is essential both to the safety of the vessel, and to the good behaviour of the instrument itself.” Again, “Compensation of large deviations by means of magnets is at best but a remedy for an ailment; better not sow the seeds of the disease.”

I should add that this inquiry was accompanied by experimental tests of the truth of Archibald Smith's mathematical theory of the deviations of the compass.

There is yet another point upon which I would make a few short remarks, that is on the constant changing of the correcting magnets of the standard or navigating compass, by which the ship's course should be shaped, even if not so conveniently at hand as the badly placed auxiliary compass. The word “standard,” as here used, refers to a position, not to any particular form of compass.

If the changes of the semicircular deviation range from zero to 4° or 5° , I think it much more advantageous to leave them alone, and trust to frequent observation for ascertaining the deviation, entering each observation in a compass journal for future reference. Should the semicircular deviation change largely and permanently, it would, no doubt, be right to correct it, taking care to swing the ship immediately after to ascertain remaining deviations.

These recommendations do not refer to manœuvring compasses, which it is most convenient to keep as nearly as possible correct, Commanding Officers giving opportunities for making the corrections as required.

As to the compass journal, it is largely used in the navigation of the many noble vessels of the mercantile navy, and a constant changing of magnets is generally deprecated by their eminently practical commanders.

Touching the question of education in matters relating to the compass, every means has been adopted for imparting sound information to Officers. At the Royal Naval College, Greenwich, the seniors find able instruction of a most practical kind. At the College in Portsmouth Dockyard, every Sub-Lieutenant goes through a most useful course, illustrated by models and practical adjustments in an iron gunboat at Spithead. They are also supplied with a pamphlet of instructions in compasses and their treatment in iron ships, issued by order of the Admiralty.

After all that has been said, true science teaches us a never-to-be-forgotten lesson. Observe the deviation when possible, note it in a book, and learn its changes under every circumstance as you do the rate of a chronometer. Then on some thick dirty night, the reward will come in the shape of a reasonable confidence that you can steer the required course without delay and detriment to the service upon which the ship may be ordered.

The CHAIRMAN: I may take this opportunity of saying that I have received a note from Sir William Thomson, addressed to the Chairman, regretting not being able to be present to-day. I am sure you will all join in that regret.

Admiral Sir ERASMUS OMMANNEY, F.R.S.: I am very glad to find that we have this subject brought before us again after such a long interval, for it is now seventeen years since Sir Frederick Evans delivered a most instructive address here regarding the magnetization of iron ships and its effect on the steering compasses. During this interval a wonderful alteration has been progressing in the construction and in the metal of iron ships, likewise in the improvement of steering compasses; we are therefore grateful to Captain Creak (the able successor to Sir F. Evans) for the instructive paper we have now heard, containing so much scientific and practical information of great value. I will not attempt to criticize this paper, coming from such an eminent expert as Captain Creak, than whom there is no higher authority in the kingdom on this important question. In my opinion the author of this paper has put the whole matter before us, as it now stands, most completely. I regret to observe so few naval Officers present. Let us hope this paper will be read elsewhere, very extensively, beyond this room. The influence and effect of magnetism, which operates so mysteriously and invisibly over the surface of the earth, renders it more incumbent for the mariner of the present day to study more attentively this branch of science and the properties of this secret agent which possesses an individuality in every metallic ship which traverses the wide oceans, in order to secure accuracy for its navigation. I am sure we are all much indebted to Captain Creak for producing this very instructive paper.

Captain WHARTON (Hydrographer to the Navy): Captain Creak's very able and lucid paper so fully covers the ground and opens up so many questions that there is not much left for me to say. I may remark in starting that I heartily agree with all that he has said, although I do not pretend to be such an authority on the subject as he is. I think he very prominently brought to everybody's mind the enormous difficulties that there now are in correcting compasses on board our men-of-war. For some years there have been difficulties, but it is not too much to say that they increase every day. There is no doubt that in war-time the compass you will want is a compass that you can depend upon in a conning-tower, and these are just the compasses I am sorry to say that at the present moment are not at all reliable. The admirable invention of Sir William Thomson fails there, because in these protected positions, as Captain Creak showed, you have not room to place a compass with large spheres. Those enormous spheres not only take the whole space in these limited towers, but to a certain extent they introduce error. Captain Creak referred to the invention of Chevalier Peichl, whose compass has been introduced into the Austro-Hungarian Navy for the last five years. I believe it has been under the consideration of the Admiralty nearly as long as that, but recent improvements of Mr. Peichl's have led Captain Creak to make further experiments, the results of which are so encouraging that we are getting some more of them over to try in our ships and test their efficacy thoroughly. If it answers as we hope, it will go very far towards solving that most important question of getting the compass to work in these extremely awkward positions with large masses of iron near it, and at the same time it will take up less space. I only hope our anticipations may be justified. I may mention in connection with the difficulty of fixing the position of a ship that I have been for some time most anxious whenever there is an opportunity to inculcate the use of the station pointer. I am happy to say these instruments are now being issued to all ships, and I hope with a little practice we shall come to recognize the extreme value of that system, which in time of war, in action, and also in time of peace, in ships where there are so many obstructions to clear view from the compass, enables you to fix the position extremely accurately from either a protected position or a position where, by inclining your head a little, you can see the object which in a modern ship of war you cannot possibly get from many of the compasses. Captain Creak has brought forward the question of the disturbance of the compass on approaching shore. For a long time it was thought not possible that the compass could really be disturbed. By well-known magnetic laws the sphere of influence of any disturbing forces is so small that it was felt quite impossible that the compass passing a point of land should ever be disturbed by the

magnetic character of the rock. But in some extraordinary manner it has been overlooked that while a ship is a long distance horizontally from land, she may be passing very closely vertically over it in shallow water, and it has only been recently recognized that this is the true explanation, and that there really is a danger in certain places, the majority of which are quite unknown, in passing over shallow water, of the compass being seriously deflected. I believe now that it is known it will be borne in mind. I can only conclude by saying that I hope that our motto will always be "Onward." Finality is by no means reached. We have a very difficult task in deciding what is the best form of invention to take up. It is very slow work indeed experimenting, but I feel very safe with Captain Creak at the head of the Department looking after it. I know that he has not only a very open mind, but he has the fullest knowledge of the subject, and I have every hope in time that we shall arrive at a more satisfactory condition of the compass in awkward positions than I am afraid exists at the present moment.

Captain MAYES: I wish to bear testimony to the great value of the paper read by Captain Creak. It shows the difficulty there always has been to correct the deviation of the compass in positions where the space is limited in iron ships. It is too technical a subject to go into very much, but I will just mention a few things that I have noticed. Captain Creak spoke of permanent and sub-permanent magnetism. In the very earliest days, Sir George Airy, Astronomer Royal, spoke of a part of the magnetism of an iron ship as "permanent." He afterwards thought proper to change the term to "sub-permanent." From that time to this there has always been a doubt in the minds of many people as to which is "sub-permanent" and which is "permanent" magnetism. I cannot help thinking if we use the word permanent only, instead of permanent and sub-permanent, we should be able to express all that is required, recollecting that the magnetism of a ship is, like most sublunary things, permanent only for a time. The correction of the heeling error is unsatisfactory, and the formula given by Mr. Archibald Smith does not appear to be correct. I have always found a difficulty in dealing with it, and I do not think that difficulty is quite got over yet. With regard to the electric light, when first it was introduced into the Service, electricians were very confident that the iron about the dynamo would conduct away and shield the compass from all disturbing influences. But they seemed to forget that we are dealing with magnetic force and not electric force. Magnetic force may be transposed but cannot be cut off by iron. The only way I can see out of the difficulty is to intervene between the compasses and the dynamo a bar of iron so magnetized by a wire carrying a current when the dynamo is running, as to set up a counteracting magnetic field. There is no way of insulating it that I can see. The effect of swinging the ship to port and starboard was known many years ago. It was first spoken of by the Liverpool Compass Committee. The "Defence" was swung in 1865 both ways, showing a maximum difference of 3° , the maximum being on the north and south points. I have never seen an explanation of this disturbance of the needle which has quite satisfied me. With regard to the disturbing effect of land upon compasses, that has been known since the early part of the century; but as the Hydrographer says, it was generally forgotten that land was very near the ship sometimes when it was spoken of as being miles away. When men spoke of land, they thought of dry land, not of the wet land under the ship's bottom. With regard to torpedo-boats, some have been swung after various intervals of time, and I have been much struck with the very great permanence of the deviation of their standard compasses. The compass in the conning-tower presents insuperable difficulties for want of space wherein to apply the necessary correctors, even to the smallest compass. Captain Creak has alluded to a recent paper by Mr. Rundell. I may state with reference thereto, that no iron bar can be placed about a compass in such a manner that its deviation cannot be expressed by Archibald Smith's formula. The last part of Captain Creak's paper is perhaps the most important, that relating to the education of naval Officers on the subject. I am very pleased to hear that it is going on so well, but it has been going on several years now, and I think it is quite time that we got something out of it. This will never be the case until the Admiralty insist upon naval Officers putting to practical use the education which it has cost so much to impart. If it were once made clear that Officers are expected to adjust the

compasses of and swing their ships, even if the duty were not immediately made compulsory, it would be one step towards abolishing the present inefficient system. I do not know that I have anything else to say upon the paper, excepting that I think Captain Creak has done good service in reading it.

Admiral COLOMB: There were one or two points that struck me in the reading of the paper. I rather thought the lecturer explained better than I could, and it seemed satisfactory to my mind, the difference in apparent deviation when the ship is swung the opposite way, that it was the time required for the magnetism of the ship to, as it were, re-assert itself. I have never understood it before, but it does seem to me to be a satisfactory explanation. I would ask him in his reply whether that is what has been called Gaussin's error. I would like also if he would answer another question. Some time ago there was a strong correspondence—I must say, that with my slight knowledge, to be a rather senseless correspondence—in the mercantile marine papers, and I think in the “Nautical Magazine” also, referring to deviation of the compass in fog. May it not be that in approaching the land in a fog the shallow water had affected the compass, and that the idea arose in that way? Unquestionably all that has been said, speaking practically, about the necessity for getting some reliable compass in those parts of the ship where alone in action the command is to be—conning-towers, or whatever they may be—is exceedingly important. One is delighted to think that we may be getting hold of something of that sort in this Austrian compass, but I have always felt myself, in all these cases of the protected command of the ship, that the point is to get everything out of that place, and to have nothing but the Officer commanding, with the staff which it is necessary for him to have, to have no instruments whatever of any kind inside those places. I do not know whether anything has been done in the direction of reflection, but I cannot help thinking that we might use the principle to some extent. You might move the compass to a suitable distance and merely have the face of it reflected by a series of looking-glasses into the place where you want to see it. To my mind the trouble is analogous to what we have had in conveying the words of command, and the telegraph signals working them from the conning-tower, and I have always aimed, as long as I had power in that way, at getting apparatus away from that place, allowing the Captain's voice simply, without tubes or anything of the sort, to communicate downwards to the spot where the telegraphs and tubes and everything else were, so that he should not be troubled about anything except giving his orders. In the same way if he had merely the reflection of the compass before him I think it would be all he would probably require. My own predilections, as far as they go, have been, I must say, in favour of shifting magnets rather than fixed ones for correcting deviation. I have always thought very highly of Sir William Thomson's plan, but I am not sure I ever went so far as to think you should dispense with the standard compass and recording the magnetic changes in the condition of the ship, but I certainly have found much benefit in having a compass where you could continually correct it on the spur of the moment. For instance, when I was in the Steam Reserve at Portsmouth I had to take ships to sea, knowing nothing of their deviation, and to be at sea for eight or ten hours, liable, as happened to me once or twice, to get into fog, not knowing where you were or what you could do, with a compass that you could not trust. The plan I adopted was this. My Staff Commander laid down a series of transits as we were going out—altering the ship's head, taking the transits and correcting a Thomson's compass by them, after which we could fairly trust it. At any rate we were in a better condition from having a compass that we could correct, however roughly, than in being caught in a fog at sea without a compass that you could trust at all. I have been extremely pleased with the lecture, and I only wish that I had been more competent to follow it accurately.

Captain A. C. PARR: As the instruction of Officers at the Naval College at Greenwich has been referred to, I, as one who has been going through a course there, should like to bear testimony to the extreme interest which I have felt in doing so. Before I went there I understood nothing about the compass, and my instruction with regard to any corrections has been absolutely *nil*. As to being able to understand or get any benefit from the Admiralty Manual, I am afraid I did not succeed like Admiral Colomb in tracking the murderer to earth at all. I simply

could not understand it. But now I must say, having gone through a course of instruction at the Naval College, I have been able to follow this lecture with very great pleasure, and to thank the lecturer for it, and to feel the benefit which I have received from that course. I am also very glad indeed that the Sub-Lieutenants are receiving instruction in the compass, for I think there is the proper end to begin at. If the midshipmen know something about it, as they go on they will be able to develop and to obtain very useful information. How long the course of instruction at the College has been going on I do not know, but certainly we have many capable Officers already instructed, who would be perfectly competent to carry out any observations that might be required, and I have no doubt that we shall very soon see the results which one gentleman who has spoken hopes may soon be visible. I will conclude by thanking the lecturer for his paper.

Captain CURTIS: I might suggest to these young gentlemen, the midshipmen, that they should get a small magnet and experiment with it. One of the prettiest effects of magnetism is to take the kitchen poker, and just hold it in a line north and south, at an angle of 67° , give it a blow or two with a mallet or hammer; one end of it will become the north pole and the other the south, and you then reverse the poker and give it another blow, and you reverse the poles. I am sure that such an experiment would set any midshipman or schoolboy wondering at the effects of magnetism and excite his curiosity for more knowledge. I might also suggest, permanent magnetism is due to the hammering of iron in the manufacture of a ship, and also when she is twisting and turning about; the firing off the guns, we suggest it is that sub-permanent magnetism is produced. A ship is always altering the magnetism; when she is in the north and south line she increases it by induced magnetism of the earth, when she reverses her head she reverses the current, consequently the compasses are always liable to be corrected, "in fact magnetism is not a constant."

Sir ERASMUS OMMANNEY: Might I ask whether any amount of deviation has been detected in the magnetic character of a ship during its lifetime?

Admiral LINDESAY BRINE: As I did not hear the whole of the lecture, what I am going to say may have already been touched upon. The first point I notice is where the lecturer spoke of heeling error. I do not know whether Captain Creak means this, but he says that when a ship heels over the error is as much as 10° .

Captain CREAK: It is sometimes as much as 30° .

Admiral BRINE: I observe that in the paper you say it goes up sometimes three points on one side and three points on another. Now as regards this other very important point about the disturbance of the compass on approaching the land. You say in the case of one of your surveying vessels that running on a certain course you found the compass was "steadily deflected 30° for a quarter of an hour, during which she sailed over a mile." I suppose that would depend very much upon the nature of the ground over which she was going. Is it known what was the nature of the bottom at the point where that ship sailed over? Was it volcanic or some rock of a known character other than volcanic? I would also ask the value of the vertical attraction as compared with horizontal attraction when a ship is going over land nearer the bottom. I have never understood that to any extent the vertical attraction affects the compass in a horizontal direction. I suppose that this subject has been worked out. If you would be kind enough to answer the question it might be useful.

Captain BEALL (Board of Trade): As my experience is connected entirely with the mercantile marine, I fear I shall not be able to add much to the value of the discussion, but there are two or three points in the paper I should like to remark upon. Captain Mayes spoke just now about the term "sub-permanent magnetism." That is a point I really do not quite understand in the paper. The officers of the

¹ "Some Curiosities of Magnetism," lecture at the London Institution, February 11, 1889, by Shelford Bidwell, F.R.S. A rod of iron which has been magnetized by the action of the magnetic field is found generally to retain some of its magnetism when withdrawn from the field. This "*residual magnetism*," as it is called, is held much more tenaciously by hard steel or iron than by metals which have been softened by careful annealing.

mercantile marine, and, indeed, nearly all writers on the subject, regard sub-permanent magnetism as referring to the permanent magnetism of an iron ship as distinguished from the permanent magnetism of a permanent magnet, or magnetized steel bar, and consequently they would correct that magnetism with a permanent magnet. Captain Creak appears to apply the term "sub-permanent magnetism" to something between permanent magnetism and transient induced magnetism, or what is commonly known by the term "retentive" or "retained" magnetism. I might explain myself more clearly, perhaps, by referring to two or three extracts I have here. This is from "Towson's Practical Information on the Deviation of the Compass, for the use of Masters and Mates," a work that was really prepared as a textbook for the Board of Trade examinations. He remarks: "From what has been said it will be apparent that the term 'permanent' is not accurate when applied to the magnetism of an iron ship. Dr. Scoresby perceived this, and proposed to designate as 'retentive magnetism' the portion of the magnetism acquired on the building slip, which was retained after launching, and which he considered was retained only for a period, and under certain circumstances might be lost altogether, or even reversed. But experience has shown that this is a misapprehension, for although a ship does not retain the whole of the magnetism acquired on the building slip, yet it is certain that in all our iron ships some portion of the magnetism so acquired remains permanent. And we agree with the Astronomer Royal, Sir George B. Airy, in calling this residual magnetism 'sub-permanent magnetism.'" On the other hand, to put it briefly and clearly, the term is now applied in the following sense in the Navy. This is taken from "The Course of Instruction for Acting Sub-Lieutenants," published by the Admiralty: "Perfectly soft iron as here defined is rare, and the soft iron in ships requires a certain time to fully acquire and lose the induced magnetism. When this time is very perceptible—amounting often to many days—the magnetism induced is called sub-permanent." It is evident, therefore, that in the Royal Navy "sub-permanent" refers to induced magnetism, and in the mercantile marine, and indeed by nearly all writers on the subject, to the permanent magnetism of the ship. I think it is rather unfortunate that the term "sub-permanent," which is so well known, should now be applied to two different, in fact, opposite, things. I may say it was rather confusing to me, although I am not new at the subject. Therefore, I am sure it must be so to a great many of those who have but little knowledge of the subject. There is one more point I should like to remark upon, and that is in regard to the following sentence:—Captain Creak says: "At the bridge compass the quadrantal deviation is only about 5° , and can be readily corrected by a pair of $7''$ spheres, which also help to correct about $44'$ of heeling error for every degree of heel on the north and south points till the first 5° of heel are reached, but gradually decreasing in their power as correctors as the ship inclines further." Now, I do not quite see this, but probably I may not understand the remarks in the sense intended. It appears to me that their power as correctors, instead of decreasing after the ship heels 5° , is really increased till she has heeled over, say, 25° or 30° . Put it this way. Suppose you compensate a quadrantal $+D$ of 5° by spheres, in the ordinary way. You then put the ship's head north and heel her over; you would then find when she has heeled over 5° that these spheres would compensate about 2° of heeling error; at 10° heel, about 4° of heeling error; at 15° heel, about 6° ; at 20° heel, about 8° ; and when at 25° heel, about 10° . It appears, therefore, to me that it is a continually increasing power as the vessel goes over instead of decreasing. I do not know that I have anything further to add, but I should like to be allowed to express my thanks to Captain Creak for his very able and interesting paper.

Colonel BAYLIS: Would you forgive me for rising to ask a question? I feel that this lecture is more than usually important, it is one of universal interest. I have derived a great deal of information from this admirable lecture. There is one point which struck me before coming into this room. It is only perhaps a rudimentary question, and therefore will be most easily answered by the lecturer, and as the Journal goes far and wide throughout the world I think probably what has struck me has struck others also, and they would like to have the answer. I know something of the variation of the compass and the adjustment of the compass, and so on, and it often occurred to me whether it would be possible to get some material which

will so isolate the ship's compass that it will not be subject to other magnetic properties or influences of external matter. The lecturer has stated that the introduction of the electric light on board ship has been a source of danger to the successful working of the ship's compass, and that experiment has fortunately now shown that with a well-designed installation all trouble may be avoided. It occurred to me, before I read this paper or came down here, that some better method of isolating the ship's compass might yet be discovered. If it had been, it no doubt would have been brought into use, but is there any likelihood of some mode being discovered by which you shall be able to isolate the ship's compass that it shall not be liable to be affected by external magnetic properties, and only the natural magnetic direction prevail? I think that it would be useful to myself and it may be to others that my question, though simple to him, should be answered by so experienced a lecturer.

Captain CURTIS: You can isolate electric wires by gutta-percha, but unless you can get transparent gutta-percha to see the compass through, I do not see how you can isolate it.¹

The CHAIRMAN: Before asking the lecturer to answer the questions that have been put, I intended making a few remarks, but the wind has been taken out of my sails, for I think they have all been touched upon in the discussion. The first one simply was as to the possibility of having a reliable compass in a conning-tower or in a protected position to steer the ship by. In a ship of war the important point is the consideration of what may happen in action. The man at the wheel may be told to steer a course, but that is no use unless the compass is free from vibration from the concussion of gun-fire. He can see nothing from inside the conning-tower, even if there is no obscurity from smoke. Therefore he is solely dependent upon the compass. I quite concur that it is improbable that the Commanding Officer, under the fire of machine-guns and quick-firing guns, will be able to get at any other compass outside the conning-tower, if he does the chances are he will not get back again, and most probably he will find the compass destroyed. I dare say some of us here as midshipmen were very much puzzled in shaping a course between the variations to be allowed to the right and deviations to the left, &c., and when we had to pass examinations for Lieutenants, it was a stumbling block to a great many of us. It is a comfort to the younger members of our Service that it is quite possible nowadays that this may be removed, and we may have a tolerably permanent corrected compass to steer by. No doubt on the compass question the sea service of all countries is very much indebted to the inventive genius of Sir William Thomson. I am sorry he is not here to-day, because we should very much like to have heard him on this subject. The compass, as it appears to me, is the same as any other scientific instrument, there can be no finality in it, and we must go on improving. As time goes on, new discoveries are made in magnetism, and new inventions in construction, as in almost every other subject. Then we must remember this, that different compasses are required for different positions in a ship, and that one that would be suitable in the conning-tower probably would not be suitable outside. In the conning-tower, what with the iron walls surrounding it and the magnets required for compensation, it is a wonder to me that you can get the compass card to move at all. The directive force of it must be very high indeed to overcome all these difficulties. I think after all, the main point comes to this, that the whole question of compass designing and compass construction must be a matter for open competition. The inventive talent of the country must be called upon to combine with the experience of the sailor, and asked to advance. There are many marine instrument makers in England, and in compass construction competition is as important as in any other trade in the country.

¹ At present no substance is known to isolate magnetism. Vibration or jarring has a remarkable effect in removing the "residual" magnetism of "soft iron."

I think it redounds to the credit of the Officers navigating our men-of-war that not more accidents occur through the error of the compasses.

I believe many merchant ships get embayed by shaping their course too fine from point to point at night, and run ashore, by the errors of the compass.

Staff Commander CREAK : I must first return my sincere thanks to the Hydrographer for his very kind remarks with regard to me in the matter we have discussed. As he has not made any special remarks except in support of my views, I have nothing to answer. I also thank Captain Mayes for his kind support. Admiral Colomb asked me one or two questions. One was about Gaussin's error; whether this difference of deviation resulting from swinging in opposite directions was due to Gaussin's error. It bears something of that character, but I really think it arises from the cause stated in the paper, though I am not quite satisfied with what I have said about it. A certain amount of iron in the ship parts with its magnetism instantly, the same as when you roll a soft iron sphere rapidly on a table, and no trace of magnetism is carried round with it; but there is another kind of iron in the ship which is not quite so soft, and takes some little time to part with its magnetism. I think that is really the cause of the deviation being different when swinging different ways. Then with regard to fog. The Captain of a merchant ship with whom I was once talking complained that he was constantly being troubled with the effect of fogs on his compass in the Baltic. I asked him to try it systematically, and to send me the result when he came back. He was to go to some place in the Baltic and lay alongside the quay; when there to note whether the compass altered after fog had come on, and then I should believe in it. He never could tell me such was the case. I found it simply arose from this fact: when they were steering up amongst the various islands in the Baltic, as long as it was clear weather, although the man at the helm often let the vessel fall off her course, the land being always in sight, the Captain could haul up a point or so, as required. After the fog came on the helmsman steered no better, whilst the Captain's corrective for the bad steering was no longer available, and the fog was blamed. I believe that is the sole cause. We know that the most delicately constructed instruments at Kew are in no way affected by the fog. Reflection applied to the compass is another question. I do not see how it is to be done. I think if you come to think of the smoke with which we should be surrounded in action, we should hardly see any reflection. Steam especially has a very bad effect upon all reflectors. They have often been proposed, but I can see no way to the use of reflectors. I quite agree with what Admiral Colomb said about the frequent corrections of the manœuvring compass, and the auxiliary compasses used for steering might be corrected as often as desired, and Commanding Officers should give an opportunity for it to be done. I know in some ships the complaint is made, "Why is the compass not correct?" and the answer has been, "You have not given me the opportunity of correcting it." The magnetism of the iron of a ship is liable to changes, and the deviation of the compass must change in obedience to them; therefore there must be constant correction. Captain Parr has made some well-deserved remarks about the instruction at Greenwich. I am glad to hear he is satisfied with it, and I dare say he will be ready for the next examination when it comes on. I must also thank Admiral Ommanney for his kind remarks about this paper. Respecting the change of magnetism of a ship, I must say that there is a definite character impressed upon her in building which is never lost. Admiral Brine asks about the heeling error. Perhaps I have not made myself perfectly clear on that question. What I mean is if you take the heeling error of $1^{\circ} 10'$ obtained for the standard compass of the "Orlando," by actual inclination of the ship for 1° either to starboard or port on north and south courses, then, if that ship were inclined 10° , there would be $11^{\circ} 40'$ of heeling error.

Admiral BRINE: That would be constant all through.

Captain CREAK: No, it would alter as the cosine of the azimuth of the ship's head, and would be zero at E. Take N.E., the intermediate point, for example, you would have to multiply the $11^{\circ} 40'$ by 0.7, and you would get as result a heeling error of about $8^{\circ} 10'$ on that point. I may say with regard to the remarkable disturbance of the compass at Cossack, Australia, that unfortunately the "Meda" did not return there, and therefore as full an examination of the spot was not made as was desirable, though the best was done in the time available. The whole of that part of Australia is very highly magnetic. There are ferruginous rocks in several parts of Australia; in fact one may observe the red lines passing through the sandstone rocks, many of them very highly magnetic. With regard

to the vertical force of these rocks where the compass is concerned, the only thing to be feared is a possible horizontal component to their total deflecting power. Captain Beall made some remarks about sub-permanent magnetism. The word "retentive" I have never taken to. "Retentive" means something that is kept, not parted with; but "retentive magnetism" in the way we see it described in the books is anything but retentive in the natural meaning of the word.

Captain BEALL: I say you call "permanent" what we call "retentive."

Captain CREAK: I am only speaking of the word "retentive." Now with regard to the word "sub-permanent" I think that is another matter, in which we must move a little with the times. When the Astronomer Royal adopted the word "sub-permanent" it was his opinion that the whole of the magnetism of the ship was more or less sub-permanent and not permanent. By the investigations I have shown in the early part of the paper almost the whole of the magnetism of our men-of-war is permanent, so why call it sub-permanent? I speak of sub-permanent magnetism which has the character of permanent magnetism in a measure, but is subject to constant change either from running on one course or from the blows of firing guns and various other causes. With regard to the heeling error caused by spheres, I have made experiments with $8\frac{1}{2}$ -inch spheres attached to a Thomson binnacle, and found that if you incline that binnacle, for the first 5° of inclination there is a heeling error of $55'$ for each degree of heel; for the first 10° about $50'$, and if you incline it to 30° you will find it is $20'$ for the last 5° of heel. I conclude, therefore, that whilst the heeling error is a constant quantity and goes on increasing equally for every degree of heel till 30° is reached, the effect of the globes as correctors is a diminishing quantity.

Captain BEALL: I understood Captain Creak to mean that, supposing for the sake of clearness the heeling error were a constant quantity, say 4° , then, if the vessel heeled over more than 5° , the spheres would not be so powerful, or in other words would not compensate the supposed constant error of 4° . But perhaps I may have misunderstood Captain Creak, and he means to convey that they decrease in power proportionately to the heel of the ship, but even then it would appear from the figures given in my remarks, which were obtained from actual experiment, that the decrease would in some cases be very small, if any. I found that spheres (about $4''$) which corrected a $+D$ from athwartship iron alone, also just corrected the heeling error caused by the same iron up to 25° of heel; and no doubt would do so beyond that.

Captain CREAK: What I mean exactly is this, that the globes do not do as much work at the extreme heel of 30° or 40° as they do during the first 5° . Then, with regard to the point mentioned by Colonel Baylis, asking whether some insulating substance cannot be interposed to eliminate the magnetic effect of the ship on the compass; that has been tried by several people. Some have tried it by using soft iron and various other substances, but we know perfectly well it cannot be done. The directive power upon the compass is the earth, and we have already interposed between the compass and the earth a very big magnet and a lot of small magnets in the shape of a ship, and her fittings, as well as armour-plating of soft iron, which adds to the difficulty. I know of no substance which can be interposed between the compass and the ship which does not isolate it from the directive force of the earth. I am very glad to hear that our Chairman believes that there is no finality in the question of compasses, and that anybody, no matter who he may be, who will bring forward some improvement, should be courteously entertained and his proposals fully gone into, and, if good, adopted. I should not like to sit down without making one remark with regard to the Constructive Department of the Admiralty, and acknowledge the ready manner in which the Director of Naval Construction and his whole staff meet me in every way, by affording me every facility for carrying out experiments or desirable improvements in the disposition of the compasses in our ships. I have also to return my thanks for the kind attention with which my paper has been received.

The CHAIRMAN: I meant to have referred to the question of the reflector for compasses, raised by Admiral Colomb. I have had some experience with reflectors with reference to gun-fire, and found they were always dim on board ship and generally out of order. They have never been able to stand the shock of gun-fire.

I remember on one occasion at Shoeburyness the disappearing gun was being fired with reflecting sights. The captain of the gun looked up over head into the reflector which was above the parapet. The gun was fired and everybody looked out towards the target, 1,500 yards off, but instead of the shot striking the water near the target, we found the gun had been pointed about 45° to the left, and the shot had gone through the roof of a shed in that direction owing to the reflector having got disturbed. It now devolves upon me to return our thanks to the lecturer for his admirable lecture which had led to a very interesting discussion.

P.S.—I can bear testimony as to the efficiency of the liquid compass for boat service; forty years ago one liquid boat compass was supplied to the flag-ship on the West Coast of Africa. Boat cruising after slaves was carried on to a considerable extent mostly out of sight of land. This liquid compass was the only one that was of any use when rowing hard or in a sea-way, all others would vibrate three or four points off the course each way.—H. B.

Wednesday, June 19, 1889.

REAR-ADMIRAL P. H. COLOMB, Member of Council, in the Chair.

THE MECHANICAL COALING OF STEAMERS.

By MR. JAMES RIGG, C.E.

BEING aware that the question as to the best method of coaling war steamers has already on more than one occasion been treated of and discussed at this Institution, I should not have ventured to offer the following observations and drawings for your consideration, were I not convinced that there is yet very much to be done in this matter before our Navy can be regarded as the perfect fighting machine that it might be if it could be kept continuously coaled, irrespective of proximity to coaling stations or ports. We are not about to consider abstract propositions, but rather definite and ascertained requirements, and the methods which I shall advocate have suggested themselves from an experience of many years in my business of a mechanical engineer, specially in the manufacture of machinery for loading coal under various conditions.

Though it is true that the great bulk of the coal-loading machines which I have constructed—upwards of 500 in number—have been for loading coal as received from the pit-shaft, the information obtained has a direct bearing upon this question of coaling steamers.

Three distinct sets of circumstances occur and have to be dealt with, and, though the necessary limit of time does not permit of my entering with such detail as might be desired, I hope to be able to make my proposals clear. They are to coal steamers as follows:—

First. At a station where the coal is received in railway trucks which must be raised to a sufficient elevation to enable them to discharge their load into the vessel to be coaled.

Secondly. From barges or lighters in smooth water.

Thirdly. From steam colliers.

Now, the object being to provide an expeditious and safe method of coaling under all the above-named conditions, the question may arise, what advantage is there in doing so when the bunkers frequently cannot take the coal so quickly as it can be placed on board? The reply to this is that the authorities will be satisfied in all cases if it is put on board overall, irrespective of the bunkers or their position, which latter is often regulated by more important considerations, but one rule in connection with them should never be departed from, viz., that the aperture for admission should be smaller than the trunk for

communication (where one exists), and that having once entered it must pass by the force of gravity alone into the bunker. The value of the coal as a source of protection is fully recognized, but though it is frequently necessarily placed in inconvenient positions, this is no reason why the above conditions as to its admission should not be fulfilled.

The problem for consideration is, therefore, simply one involving the delivery of the coal, under the various circumstances stated, overall, to be conveyed where the bunkers are not under the point of delivery, by the crew, and in the case of vessels constructed with side bunkers, into them direct, and, if possible, into both sides simultaneously.

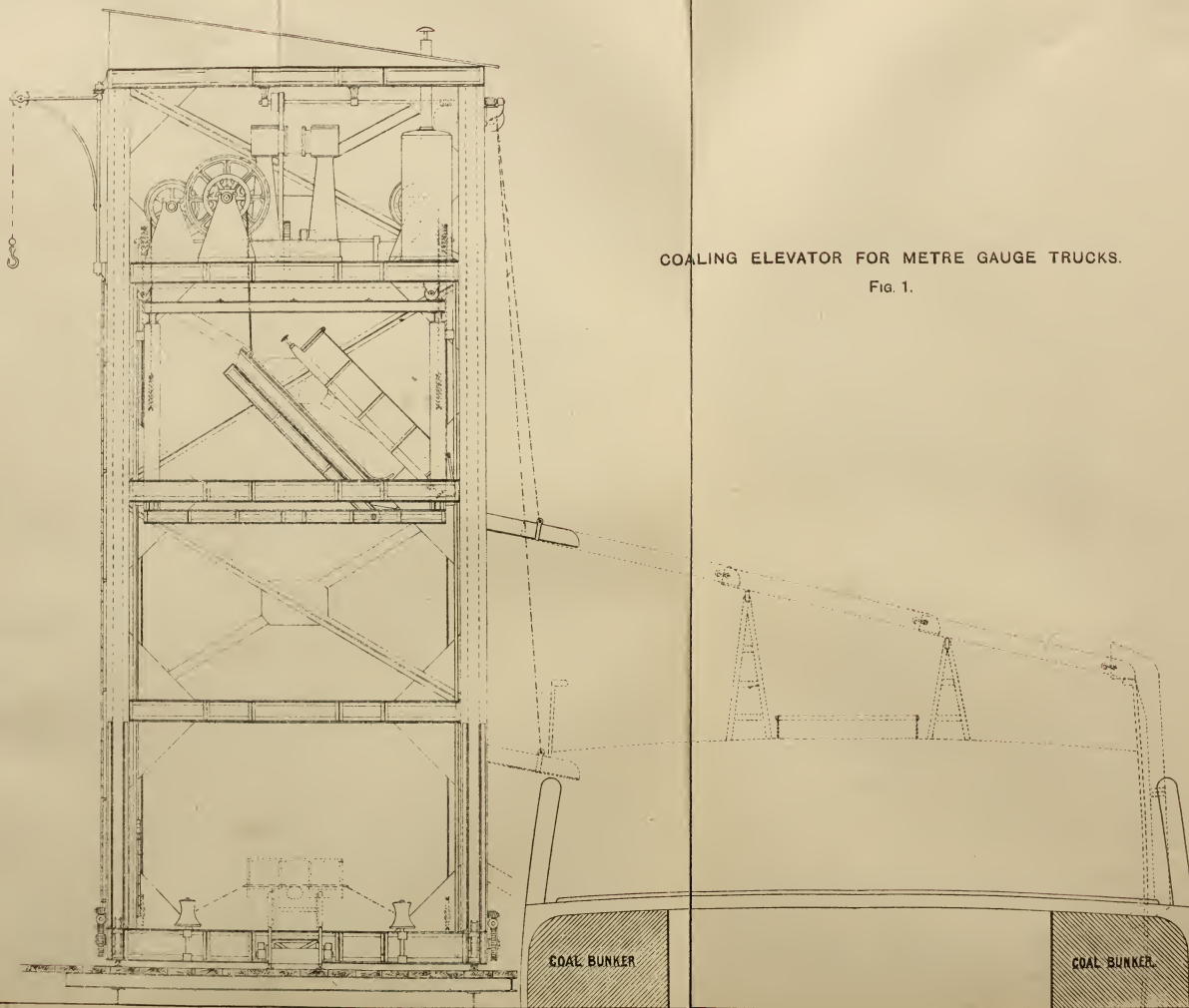
The first system which I will describe is suited to many of our Colonies where coal has been discovered and is being worked, such as New South Wales, Nova Scotia, Natal, and New Zealand, in which latter Colony I suppose some of the finest seams in the world exist; and I observe from an article in the "Colliery Guardian" of the 10th May last, that some vessels of the Royal Navy recently in New Zealand waters were there coaled with such satisfaction to their Officers that it is probable that those on the China Station will in future receive their fuel from this Colony.

In illustration of the first system I give a general side elevation (Fig. 1) of a Portable Elevator for which I recently prepared the drawings and specification, and it is now being built in France by a French company for erection at Venezuela, and is to be used there mainly for coaling mail steamers, but also for loading coal cargoes. As a rule, one, or, at the utmost, two such elevators would be required at our various Colonies from which ships-of-war should be expeditiously coaled. As each elevator for this purpose must be self-contained and complete, the extensive systems of hydraulic tips, though admirably adapted for simultaneously coaling a number of vessels, are unsuitable in the present instance where it is only desired to coal one at a time.

With a view to simplify the matter and avoid the multiplication of drawings, I have given in this case one elevation only. (Fig. 1.)

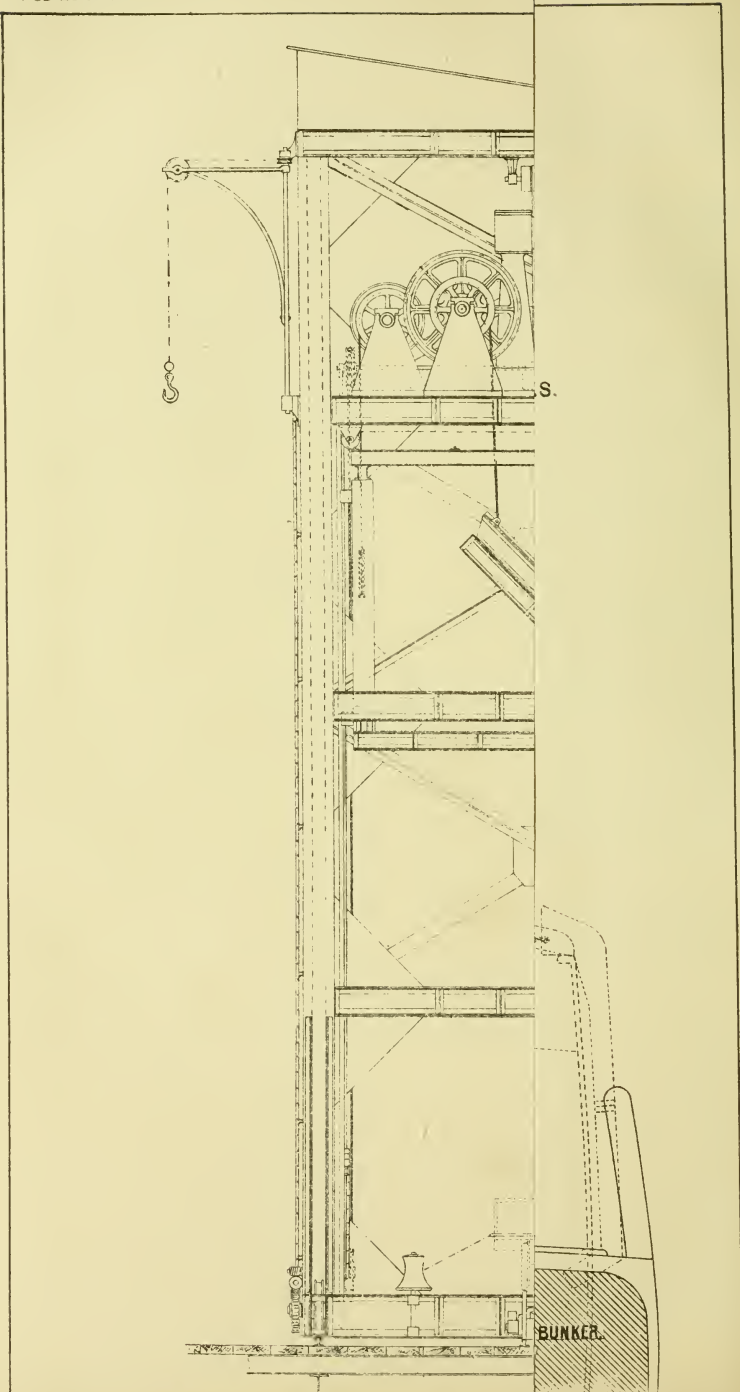
The coal comes down from the collieries in metre-gauge end-door wagons of a gross load of 9 tons, viz., coal 6 tons and tare 3, and the machinery provides for this load being raised 33 feet.

The structure is rectangular in plan and about 65 feet in height, and carried upon twelve steel wheels, four on each of the outer rails at about 25 feet apart, and two each on the metre-gauge centre wagon road. The various motions are performed by a pair of vertical engines in the engine-room above. They include hauling the loaded wagon up hinged rails on to the tipping turntable platform within the elevator, the capstans for this purpose and for slewing the wagons athwart, as well as worm gearing for propelling the elevator along the pier to positions opposite the ship's bunkers, being driven by steel wire ropes from above. The elevation of the wagon is performed by the engines through mortice gear and two sets of worms and drums, the balanced platform being thus always suspended by duplicate sets



COALING ELEVATOR FOR METRE GAUGE TRUCKS.

Fig. 1.



of steel wire ropes, one pair continuing to support it in the event of breakage of the other. The wagon may be stopped at any elevation, and tipped by other gearing shown in the drawing, to 45° , which experience shows to be the correct angle of delivery for coal when loaded from end-door wagons.

The whole of the operations of raising, lowering, tipping, actuating inclined hinged rails, controlling an adjustable delivery shoot, propelling the elevator, and working the capstaus are performed by the pair of engines, suitable clutches and levers being provided for all these motions. The engines are driven by a pair of vertical boilers, and the turntable platform is balanced by a series of cast-iron weights moving in slides, the main uprights and platerwork throughout being of steel riveted to steel angles. It will be observed that this arrangement of gearing provides for the wagon being stopped in any position of its ascent, and the short shoot may for a similar reason be placed at the height best suited to the varying freeboard of a vessel being coaled, or to her changing height from the pier dependent upon the state of the tide. The small jib-crane shown on the left is for raising coals and stores to the engine-room.

To illustrate the application of this elevator I have shown in full lines a midship section of H.M.S. "Leander," and above this in dotted lines a section of a mail steamer, and the method provided for delivering coal into bunkers on both sides.

The machinery of this elevator is calculated to raise and deliver coal from twenty of these 6-ton metre-gauge wagons, or 120 tons per hour, thus:—

Haul on to platform....	30 seconds.
Slew athwart	10 "
Raise (say 17 feet).....	35 "
Tip	10 "
Lower (17 feet).....	35 "
Slew fore and aft	10 "
Haul off	20 "
Time wasted	30 "

180 seconds = 3 minutes.

Under ordinary circumstances it will thus be seen that an elevator of this construction will raise and deliver coal from an average height of 17 feet at 120 tons per hour, or a vessel taking 500 tons would be coaled in about four hours. The same system applied to 10-ton narrow gauge trucks would result in this quantity being put on board in two and a half hours. The engine driver controls all the motions, so that, after allowing for hooking on trucks, opening doors, &c., the cost per ton will be extremely small. The estimated weight of this elevator is 50 tons, and the provision of a means of self-propulsion enables it, when a steamer has been coaled, to be readily removed along the jetty, the rails upon which are thus available for goods trucks in connection with the loading and discharge of general cargo.

It should perhaps be mentioned that, to make the drawing more clear, the diagonal braces in front have been omitted.

In proceeding to the consideration of the second system, coaling from lighters, and the third, from steam colliers, in each of which I propose to employ a continuous succession of open buckets, or rather, trays, I would point out that the amount of coal delivered is not a measure of the capacity of the machinery employed, because coal cannot be taken up as grain and other substances are, but must be loaded by manual labour. This being so, the deductions that I have drawn are based upon the number of men for whom accommodation could be provided in the hold of the lighter or collier.

My system for discharging coal from barges on smooth water is shown in Figs. 2, 3, 4, 5, 6, and 7, and I was led to take up this subject on account of the expense, annoyance, and delay caused to shipowners, merchants, and others by passing coal, grain, and certain other descriptions of cargo in bags and baskets over the ship's side, and these objections have been by no means removed by substituting the employment of the ship's tackle in "whipping" this class of cargo on board by a means specially provided for the loading and discharge of packed merchandise.

That we may better know upon what we have to make improvement it will be convenient to refer to facts, and I have much pleasure in acknowledging statistics in Lieutenant Greet's paper,¹ read before this Institution on the 6th February last, as the source from whence the following calculations are made with reference to the methods of coaling in the recent naval manœuvres by bags, baskets, and by whipping.

For simplicity and comparison, I reduce the calculation to the amount of coal drawn from one hatch, and have taken the most favourable view. The coal was loaded from lighters at Plymouth, and a lighter and jetty at Portsmouth:—

"Agincourt,"	Plymouth,	500 tons,	12 hrs.,	or 1 hatch,	250 tons	=	20½ tons per hr.
"Iron Duke,"	"	330 "	22 "	1 "	165 "	=	7½ "
Do.	Portsmouth,	55 "	2½ "	1 "	27½ "	=	11 "
							39

or an average pace of 13 tons per hour.

The machinery of this elevator is carried upon six pontoons, bolted together to make up two lengths each of about 60 feet by 6 feet in diameter; they support a deck about 74 feet in length by 24 feet beam. At the top of a central steel lattice tower is a head, which is capable of revolving upon a roller path.

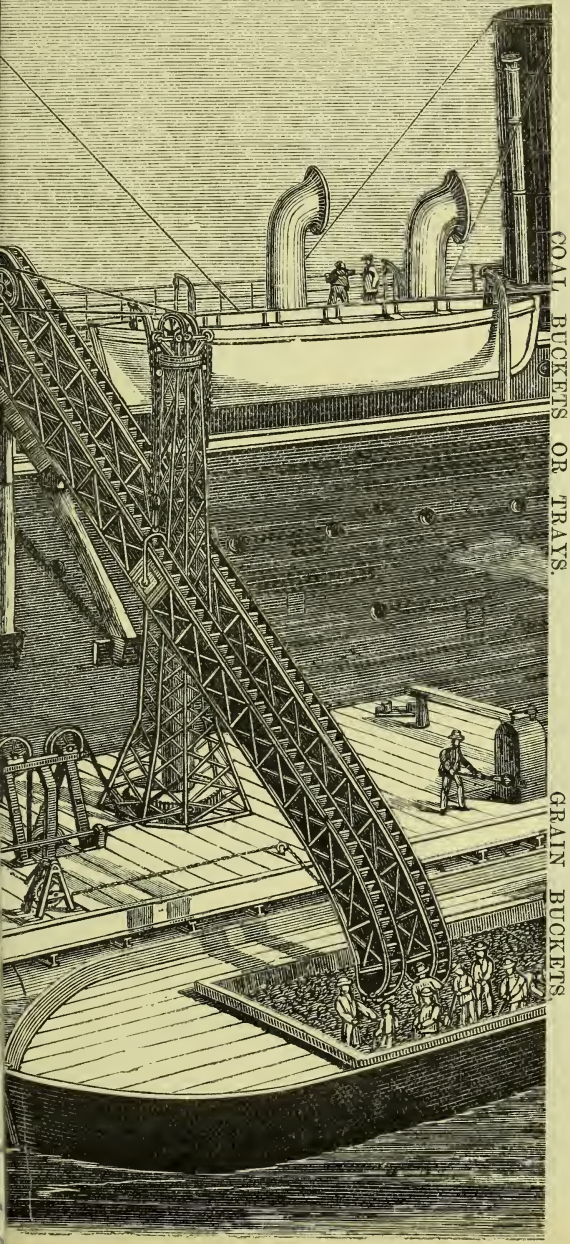
Suspended from this head upon the tower are a pair of steel lattice girders, curved at their lower ends and connected together. Each girder contains an endless chain of elevator buckets or trays, and when not in use these suspended girders are stowed away fore and aft, as shown on the side elevation, Fig. 2, and end elevation, Fig. 3. A pair of winding engines is fitted with three sets of gearing, viz.:—

¹ See Journal, No. 147, page 69, *et seq.*

FLOATING ELEVATOR IN OPERATION.

Fig. 7,

FE 16.



COAL BUCKETS OR TRAYS.

Fig. 4.

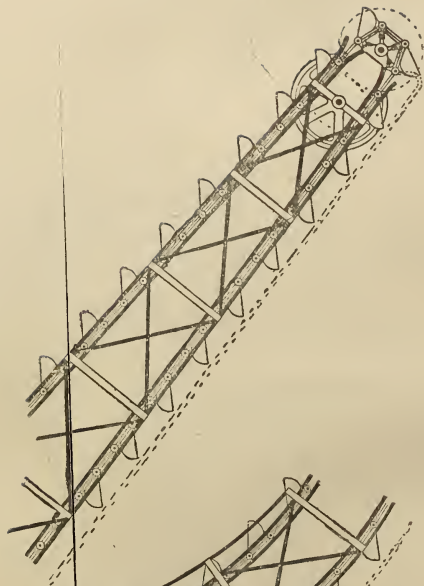
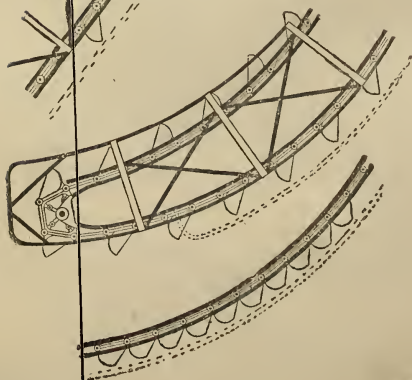
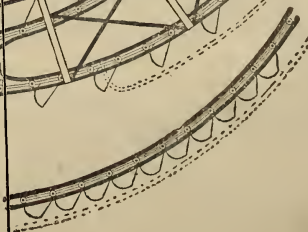


Fig. 5.



GRAIN BUCKETS,

Fig. 6.

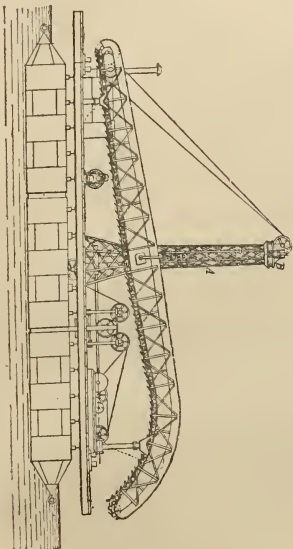


FLUISING MACHINE.

(STOWED AWAY FORE AND AFT.)

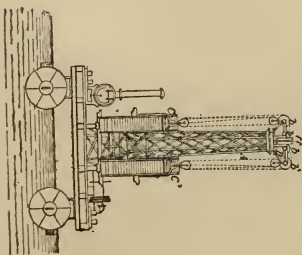
Side Elevation.

Fig. 2.



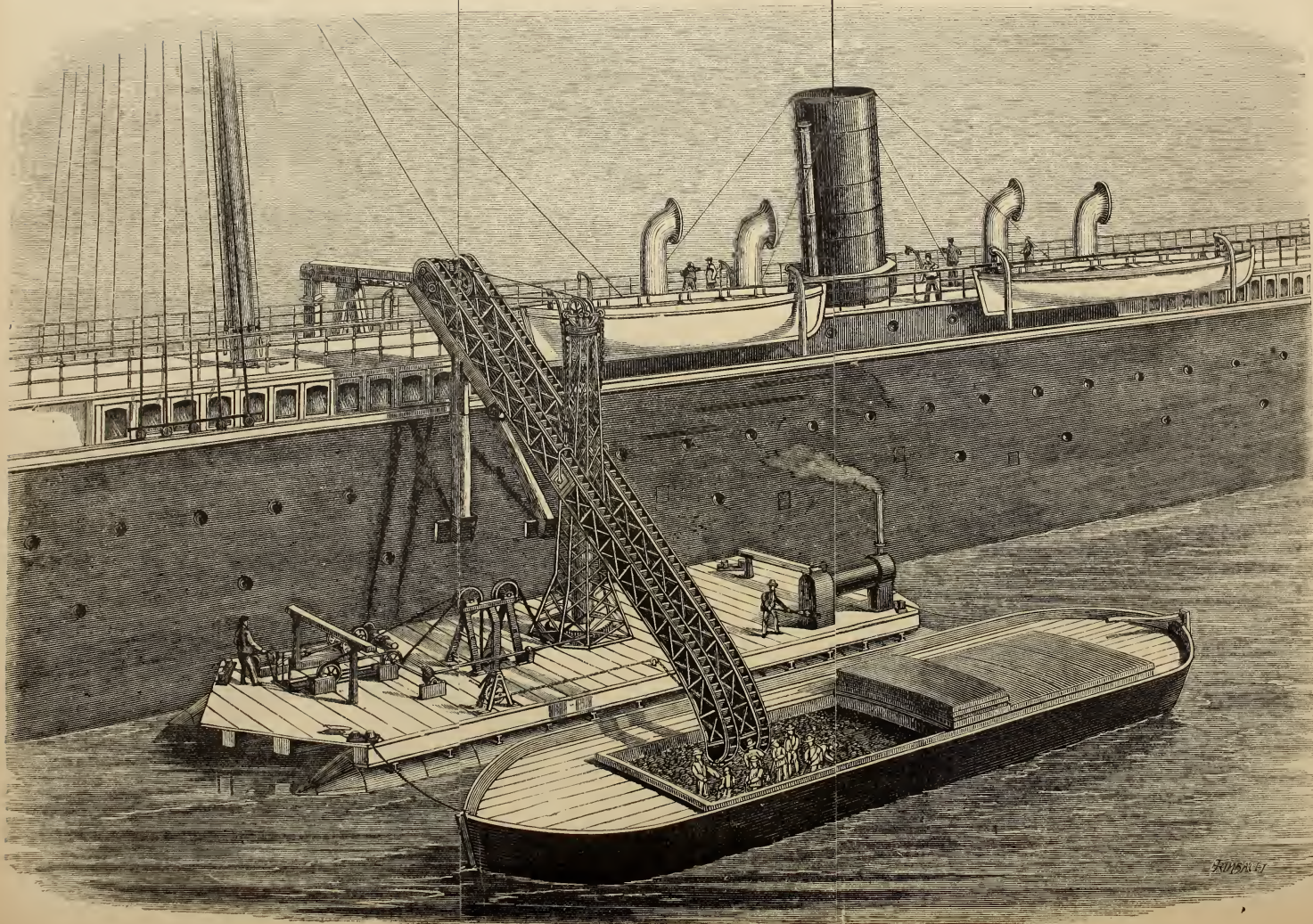
End Elevation.

Fig. 3.

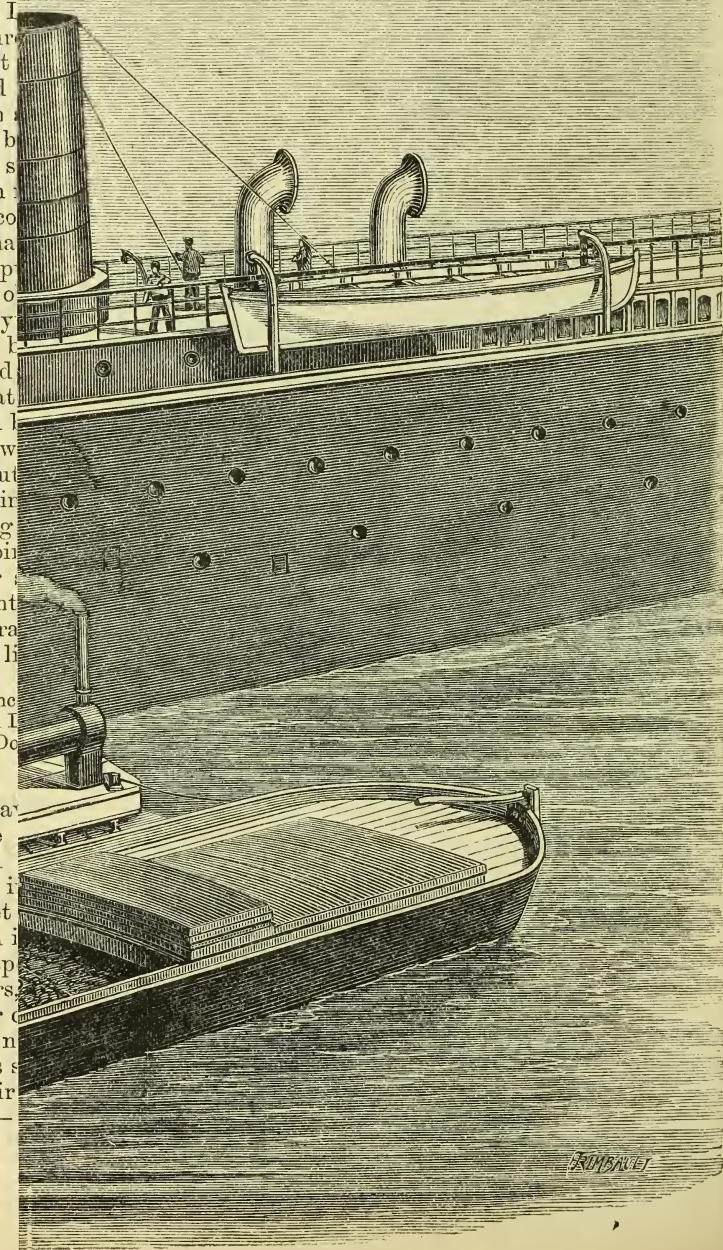


FLOATING ELEVATOR IN OPERATION.

Fig. 7.



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ROMBARDI

For raising and lowering the bucket girders.
 For slewing them athwart; and
 For driving an endless steel wire rope.

The form of trays which I prefer for coal are shown in Figs. 4 and 5, the first being the upper or delivery end, and the latter the receiving end, which dips into the hold of the lighter about to be discharged. The distinction between coal and grain buckets will be seen on reference to Fig. 6, this being the form adopted on one of these elevators, which I built for discharging grain from lighters at Sulina, on the Black Sea, where I found they took up and retained their charge until delivery at the upper end of the suspended girders into the steamer's hold.

Fig. 7 shows this elevator hauled up athwart the pontoon, and delivering coal into the side bunkers of a mail steamer. The grain elevator, when under pressure, as I mentioned on a former occasion at this Institution, was certified to have delivered grain at a pace of nearly 160 tons per hour, thus indicating the amount of work it is possible to transmit through a $\frac{7}{16}$ -inch diameter steel wire rope, driven by a pair of 7-inch diameter cylinders. On the former occasion referred to I showed that men employed in coaling steamers by manual labour were capable of lifting 7 tons per hour, and these girders, accommodating eight men in their immediate proximity, would therefore result in one elevator placing on board 56 tons per hour, or if both sides could be coaled simultaneously, as in the case of the "Agincourt" at Plymouth, instead of occupying twelve hours in putting 500 tons on board, four of these floating elevators would have performed the work in less than two hours and a half.

To assist in arriving at a correct conclusion as to the policy of adopting a mechanical method for coaling steamers from the point of view of economy as well as expedition, I may perhaps be allowed to quote my statements in February last, giving the result of investigations I made into this question at Liverpool:—

Cost of Bunkering Coal with Patent Elevator.

	£	s.	d.	s.	d.
Engineer, per week.....	2	0	0		
Stoker	1	7	0		
Additional labour (two men)	2	10	0		
	5	17	0		
Depreciation, 10 per cent. on cost of elevator (£2,500) for one week	4	16	2		
Coal and stores per week (three working days)	3	5	0		
Filling—eight men, each 7 tons per hour=56 tons per hour, or 560 tons in 10 hours (1 day)=1,680 tons in 3 days at $1\frac{1}{4}d.$ per ton	8	15	0		
Trimming—1,680 tons in bunkers at $2\frac{1}{2}d.$	17	10	0		
Royalty on 1,680 tons at $\frac{1}{2}d.$	3	10	0		
	43	13	2	per ton.	
Present charge is 1,680 at 1s. 6d.....	126	0	0	=	$11\frac{3}{4}$
	82	6	10	=	$0\ 11\frac{3}{4}$

The best gangs of coal stevedores having been thus found capable of lifting, each man, 7 tons of coal in sixty minutes, eight men, therefore, being a gang capable of working at these elevators, would result, as shown, in 1,680 tons being loaded in three days, and as each man employed received $1\frac{1}{4}d.$ per ton, the cost for the labour of the eight men only engaged upon this work in the lighter in connection with my elevator would be $8l. 15s.$ The charge by the stevedores was $1s. 6d.$ per ton, so that the economy resulting by the adoption of machinery would be $1s.$ per ton. On a single occasion of coaling a steamer taking 1,000 tons there would, therefore, be a saving of 50%.

If there should be any advocates of the intermittent system of "whipping" coal as compared with a continuous delivery from an endless chain of buckets, though the work was in grain, the following observation that I made when out in Sulina, has a direct bearing upon the question. Floating cranes were placed as my elevator is (Fig. 7), between the steamer and the lighter. Though the crane and bucket were worked with the utmost skill and under the most favourable circumstances, the quantity loaded was below 35 tons per hour.

With reference to the economy in bunkering coal by my elevator, as compared with the cost by manual labour, I have already shown that, whereas the cost by the former is about $6d.$, the latter is $1s. 6d.$ per ton, and that my system, as compared with the present method, would deliver 56 tons instead of the average of 13 tons per hour over one hatch. The total weight of this elevator, with its pontoons and deck, was about 70 tons, and I should add that the perspective view appeared with a descriptive article in "Engineering," of the 28th July, 1882. The time occupied in changing from the position laid down fore and aft, as shown in Fig. 2, to that athwart and in operation as in Fig. 7, was under five minutes.

My third and most important proposal is to apply machinery to the discharge and transfer of coal direct from steam colliers, and if adopted would involve the abolition of the "bag and basket" system as well as that of "whipping." Before, however, considering it in detail, I am glad again to make use of figures in Lieutenant Greet's paper, showing what actually occurred in coaling from colliers at Lamlash during the naval manœuvres last summer. The statistics referred to the following seven vessels:—"Agincourt," "Shannon," "Iron Duke," "Tartar," "Neptune," "Inflexible," and "Inconstant." The work appears to have taken place in fine weather and under favourable circumstances.

The total weight put on board these seven vessels was 1,227 tons, and the time occupied seventy-two hours. As two winches and hatches were in operation the quantity will be halved, say 614 tons in seventy-two hours, being thus equal to about $8\frac{1}{2}$ tons into one hatch per hour.

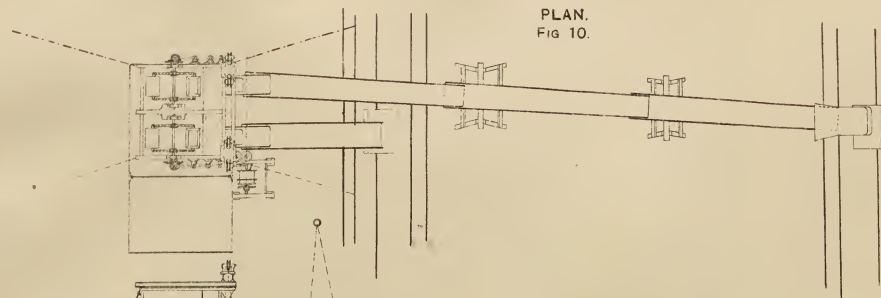
It is now, I think, generally admitted that desirable and necessary as fortified coaling stations are, the present condition of naval warfare and this country's scattered interests throughout the world are such

MACHINERY FOR COALING WAR SHIPS FROM STEAM COLLIERIES.

(PATENT APPLIED FOR)

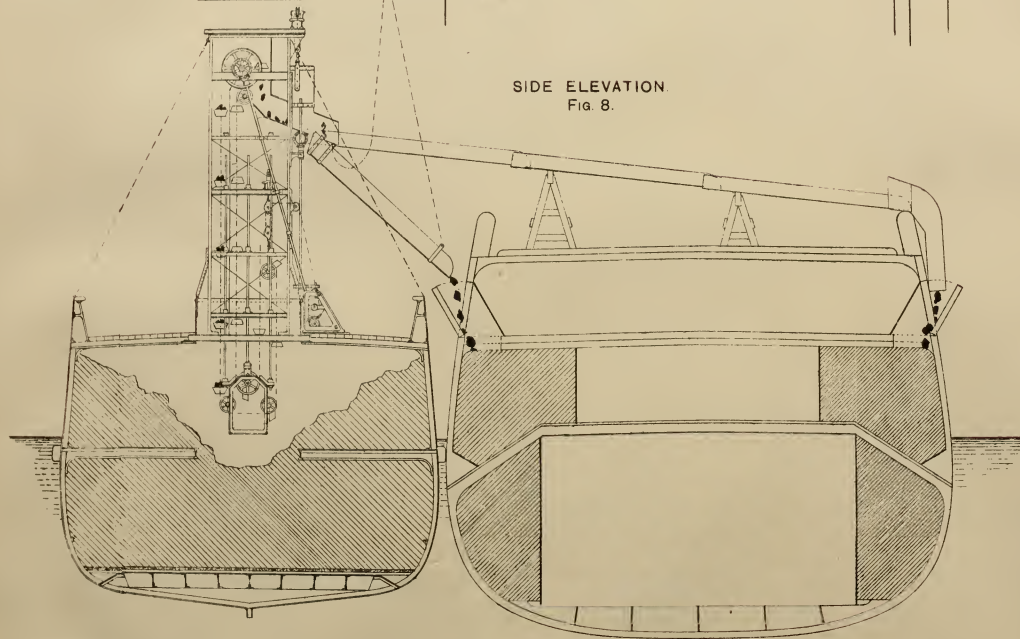
PLAN.

Fig 10.



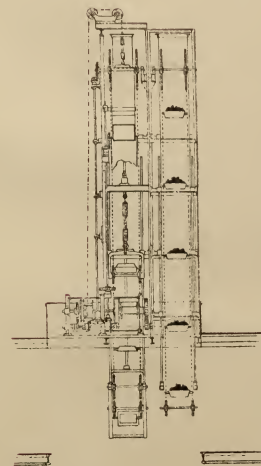
SIDE ELEVATION

Fig 8.



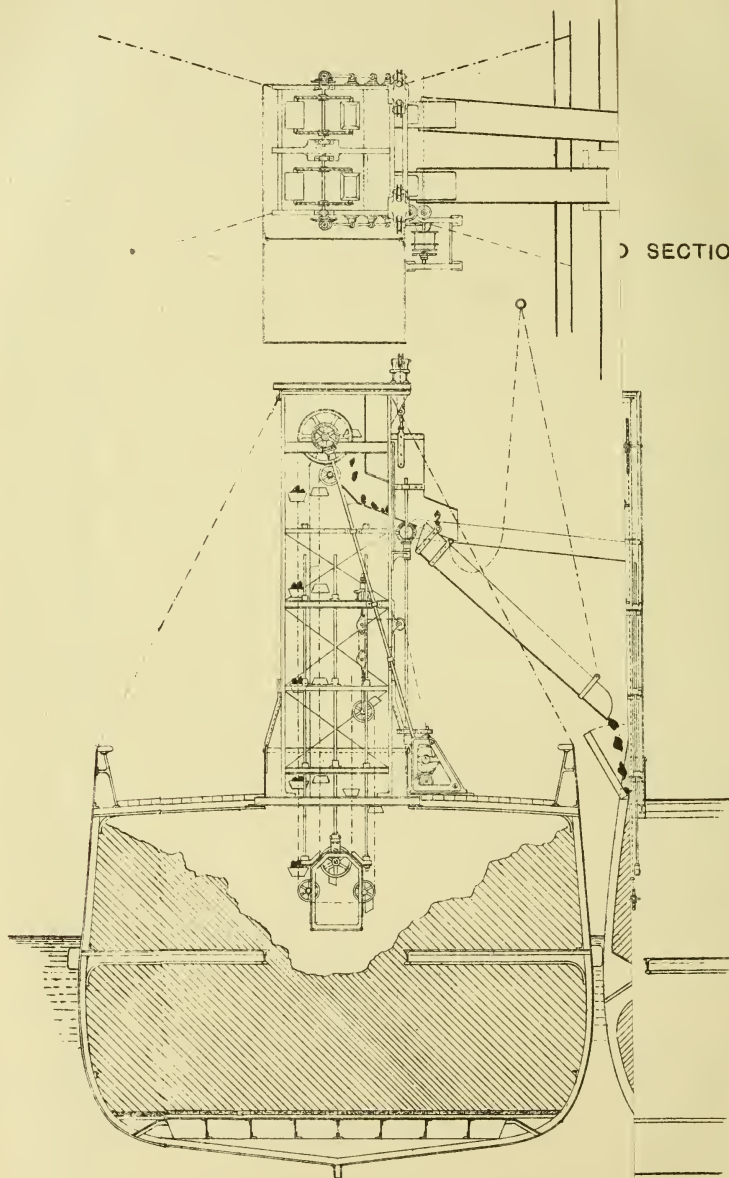
END ELEVATION AND SECTION

Fig 9



MACHINERY

SECTION



that no multiplication of these stations will dispense with the need of one or more steam colliers accompanying every fleet.

I am well aware of the objection, by those most competent to form an opinion, to bringing a collier alongside the vessel to be coaled if in the open sea on account of the swell existing in circumstances of the greatest calm. It is, however, quite reasonable to suppose that any of the vessels of a fleet operating on an enemy's coast and desiring to coal could find sufficiently smooth water under an island or reef to permit of a prompt and efficacious mechanical discharge of coal from the collier with safety. If I am therefore able to demonstrate that such a method of coaling can be devised, any objection that hired colliers are not built of sufficient strength to meet such risks as there may be, is in itself a sufficient reason why the Government should build colliers of their own of suitable strength, since they are now admitted to be as much a necessity in naval warfare as the vessels they are required to coal. The tedious delay in coaling, such as was experienced last summer, would lead to almost certain disaster in actual warfare, and the quantity taken on board per hour is a clear indication that a change must be made and a method adopted to avoid this cause of danger.

We are thus brought to a description of my proposal as shown in Figs. 8 (side elevation), 9 (front elevation and section), and 10 (a plan). This is an elevator of a sufficient height to deliver coal on to the spar-deck of H.M.S. "Mersey," of which a midship section is given with side-bunkers, both this and the section of the "Leander," shown in Fig. 1, being taken from the illustrations given in Lord Brassey's "Naval Annual" for 1887.

I propose to employ ordinary steam colliers of modern design and the best construction, and permanently to place over the hatches of each hold either one or a pair of light open angle steel frames, suitably braced and tied. A pair of chain-pulleys on fixed bearings near the top of this frame sustain an endless chain of coal-buckets or trays. These trays, in the manner most clearly apparent in the side elevation (Fig. 8), at the lower end pass over other pulleys carried by a frame which is capable of sliding up or down, being at their highest point when there is a full cargo. The return end of the chain of buckets is capable of being readily lowered down or hauled up, thus enabling them to follow the surface of the cargo as the vessel is being discharged, and to be at all times within convenient reach of the men who must be in the hold to fill them. In front of the permanent delivery-bonnet, which receives coal from the trays or buckets, is a short shoot which is capable of sliding vertically within the limits necessary to meet the varying relative heights of the war-vessel being coaled and the collier, as she may be loaded or light. Through a suitable arrangement of gearing and clutches, one of the ship's winches will be utilized for all the purposes of driving the elevator, raising or lowering either it or the sliding shoot, already referred to, or driving a "conveyor" belt should it be desired to use one for the transfer of coal across the ship. The light shoot would be placed in position by the collier's tackle, and thus suspended from a boom.

These elevators may be worked singly, but I propose placing two of them side by side, as shown in Figs. 9 and 10, occupying at least half the hatch. Being worked by one winch and in one hatch, I treat them as one, the various motions being set in and out of gear by means of clutches on the main shaft from the winch.

Though I have shown that it is possible by this arrangement of machinery to deliver simultaneously into both sides of the vessel, it would rarely be done, because this can only occur in port, and these colliers are specially intended for employment under other circumstances, as already described; moreover, a rapid delivery of coal over-all on to the deck will be accepted, as previously stated. The frames are open, and, being of steel, are extremely light, and therefore offering but little resistance to the wind, and not likely to affect the sea-going qualities of the colliers. The expense of fitting double elevators as shown in the drawings, *i.e.*, two in the fore and two in the after hold, might be taken approximately at 600*l.* to 700*l.*

As in the last case provision exists for eight men loading, and the vessel receiving coal would therefore do so at the rate of 56 tons per hour instead of about 8½ tons, and steam in the winch boiler naturally being up when she came alongside, she might commence delivery within five minutes of such assistance being put on board from the crew of the war-ship as might be desired to facilitate loading the elevator-buckets. Assuming this vessel to be one of a blockading squadron, and that she took 800 tons, one of these colliers, working both holds at 112 tons as against the present method of loading, 17 tons in two hatches, would perform the work and release the vessel for duty in about seven hours as against almost seven times that period, or forty-one hours. For this purpose the buckets or trays might be about 22 inches by 16 inches, and thus capable of taking from 35 to 40 lbs. of coal, or rather under a cubic foot each. Being speeded to pass thirty-one up each elevator frame per minute, the capacity afforded would be about 10 per cent. more than needed to deliver at 56 tons per hour; and if I have thus satisfied you that this can be accomplished, it is all that I desire.

Among the minor, but at the same time important advantages attending a system of coaling by steam-power is, that the crews of both vessels employed would thus be relieved of a large amount of work which must be of an uncongenial character in either wet weather or in fine, or in time of peace or of war.

Captain CURTIS: I think we are all indebted to Mr. Rigg for his valuable paper. He has had great experience of practical work in coaling ships and therefore speaks with great authority on the subject. I am of opinion it is a matter that this nation ought to have taken in hand long ago. Mr. Rigg has not done himself justice. He gives himself credit of saving only 11½*d.* a ton for coaling ships, whereas there is also the difference in the value of the ship's service and of the men between seven hours and forty-one hours. He states that he can coal a vessel in seven hours, whereas they now take forty-one hours to put the same amount of coal on board.

Mr. RIGG: The value of the ship certainly must be credited.

Captain CURTIS: In 1851 I went out to Rio, and the method of coaling at the Cape de Verde Islands was the collier discharged into lighters. If the vessel or

mail steamer was not there—they even had not steam lighters in those days—the coal was transferred from these lighters on women's heads and put on shore, and when a vessel wanted to coal the women picked the coal up again and put it into the lighters, and it was transferred from the lighters again to the steamers. Afterwards wheelbarrows were used, the women at first put the coals and wheelbarrows on their heads, until they could use the barrows properly. That could not be an economical way of coaling. Mr. Rigg says it is not necessary that the shoot should be at an angle of 45° . That upper shoot does not appear to me to be at an angle of 45° , and the coal would not appear to deliver itself in that slope by the laws of gravity. Grain, I think, will deliver itself at about 67° of angle. There is another point of great difficulty. In King's Lynn, where they discharge vessels with grain they have what they call meters—a man who has to weigh every sack of corn—and then it is discharged on to a driven belt somewhat horizontal, and the belt delivers it on to an up-and-down endless belt with buckets, and the corn can be taken to any part of the store they like. I am not sufficiently acquainted with the theory of the horizontal belt to explain it, but the grain always keeps in the middle of the belt. That is one of the difficulties I fancy of discharging by machinery, to know what quantity of coal the engineer gets and its weight, and also so with grain. I am sure that at Rio, where the unfortunate seamen have to whip the coals out of the ships without any awning, it would be a blessing to have one of these machines, and it would pay very well. Do I understand it is a fixture; or can it be elevated to any point you like?

Mr. RIGG: It can be elevated as shown in Fig. 7. There is a perspective view of it.

Captain CURTIS: I think the whole thing is very ingenious. When you come to work it there would perhaps be certain improvements required which no doubt you would be able to meet. I think if a company were got up at once to work these machines it would pay, save demurrage and cost of labour.

Sir EDWARD REED, K.C.B., M.P.: Admiral Colomb and gentlemen, I did not come here to offer any remarks upon this subject, but having failed to get time to read the paper over before the meeting, I came to hear it read. It strikes me that the remark which just fell from the gallant Officer was a very true one—that this is a very much neglected subject. It would hardly be proper here and to-day to consider why that is the case, but I fancy it does point to a very great deficiency that has existed in the management of the Royal Navy up to the present time, namely, that there appears to have been no one charged with mechanical operations other than certain limited and defined ones. This is a mechanical matter lying outside the ordinary duties of the only mechanical department of the Admiralty that I know of, and therefore I suppose it is that it has been very much neglected. Probably it is due to the fact also that naval Officers are so extraordinarily modest that they do not like to go an inch outside of their own immediate sphere, and to meddle with mechanical matters at all. At the same time I believe it to be perfectly true that this is a matter which has been frightfully neglected to the enormous disadvantage of the Naval Service, and to a disadvantage which might be immeasurable in time of war. Coming now to the proposals of the paper, they are obviously three in number, and wholly distinct. So far as the first proposal is concerned, that is, for providing movable elevators on shore in the Colonies and other places for the purpose of lifting coal trucks and discharging coal into vessels, that appears to me to be highly appropriate. It is well known to the author of the paper of course as to most of you gentlemen, if not all, that the system of raising the truck and tipping the coal from it is an operation carried on on an enormous scale at Cardiff; and also on a large scale at many other places. It may not be known to you all, however, that the method of moving the elevator on the wheels and rails as proposed here is also in use there. But all those operations are conducted, I believe I am right in saying, in Cardiff and elsewhere, by hydraulic power. Now hydraulic power is an invaluable thing when you can employ it for a number of purposes, and have a large and powerful plant from which you can distribute power over a large area; but Mr. Rigg proposes to deal with cases in which that would not be practical or economical, and, so far as I can see, his combination of machinery and his elevator for accomplishing the purpose is entirely satisfactory. I can see no fault

with it whatever, and although this is a matter I have had occasion to consider more than once, in so far as hydraulic arrangements go, I do not see any addition to make by way of improving his apparatus. I think very much the same might be said of the second proposal, for getting coal from lighters on board ship. Nothing can be more primitive or less satisfactory perhaps than the present system of dealing with coal. But neither of these after all is the great question that will press upon us in the Naval Service during war; it is the coaling of the ships away from the coaling stations; that is the real crux of the situation. Although I agree with the gallant Officer that a company for carrying out these various proposals might be a very successful thing, I am bound to say that I very much doubt whether it would derive any part of its success from the proposal with regard to coaling ships at sea. At any rate I do not see my way to anticipating much from that. In the first place the author speaks of a collier attending the fleet, but what is the good of one collier attending a fleet when that fleet is in active movement? It appears to me you would want a crowd of colliers attending a fleet if you are to keep the Navy coaled at sea. The author does not profess, and if he did profess I venture to think, although not a sailor, that he would make a great mistake, he does not profess to think that his method would be a satisfactory one for coaling ships from a collier at sea. He recognizes what must be familiar to every naval Officer, that the days at sea in which two ships could lie alongside of each other upon the open ocean, for the purpose here in view, must be rare days indeed. The condition of two separate vessels being so brought together is one that no one would like to depend upon, and therefore he says, and here I think he makes a little light of the difficulty—I am sure he will forgive me for speaking plainly what strikes me about the matter—he seems to make rather light of the difficulty because he says, “It is quite reasonable to suppose that any of the vessels of a fleet operating on an enemy’s coast, and desiring to coal, could find sufficiently smooth water under an island or reef to permit of a prompt and efficacious mechanical discharge of coal from the collier with safety.” Now I fear that in the most important condition of all, that of blockading an enemy’s port, it would be an extremely difficult matter when the fleet has run short of coal to find a convenient island or reef under the protection of which you could run for the purpose of taking on board coal from the collier by the arrangement here proposed. To my mind some totally different system of coaling ships will have to be adopted before the Navy can be efficiently coaled at sea. I cannot say that I myself see any mode so satisfactory as to justify me in mentioning it here, but I do not believe for one moment that the solution of the problem is to be found in merely fitting the high elevator to be driven by the ship’s windlass on board ordinary colliers, or even on board special colliers. I am rather inclined to think of some mode of coaling which would enable the one ship to throw overboard a large quantity of coal capable of being laid hold of by the ship that wanted it, and to be lifted on board by her own power; something of that kind which will not involve the actual bringing together of two patients into close contact may be found. I have had a thought of that sort, tending in that direction, but I have not gone into it sufficiently. I am not quite certain that the difficulty of bringing two ships together and keeping them firmly by the side of each other, even in a considerable swell or sea-way, is one which could not be overcome by appropriate means. If it could, then the employment of such a steam elevator as the author proposes would be no doubt a very satisfactory method of getting coal from the collier to the ship. But I need not say to naval Officers that those means of one ship taking hold of the other and combining the two together for a purpose of this kind for a number of hours must be very ample, and must be such as to give perfect mastery of the circumstances, otherwise those appliances would very soon be disposed of at the first attempt to use them at sea. I do not know whether before a more satisfactory mode of coaling at sea is discovered, a more satisfactory mode of dealing with the fires of ships will not be discovered. It appears to me most of this difficulty arises from the great necessity of dealing with coal in the way in which we do deal with it in the feeding of furnaces. Under our present system one of the great objects in order to avoid injury and deterioration of coal is to keep it as large as possible from the moment you begin to attack it in the mine till you get it into the ship’s stokehole,

and then you have to feed it in the manner well known to you. I think myself that some method of reducing the coal to dust and making it a semifluid material, dealing with it in that form, will probably facilitate the transfer into ships at sea. I leave it to naval Officers to speak as to the desirability and importance of that. I confess for my part the Naval Service seems to be so dealt with now as to make it vastly more desirable than ever it has been to obtain some means of coaling ships at sea, because of the extraordinary reduction in the proportion of coal supplies with which the Navy is being made familiar. It is well known that although much has been done to economize fuel, the proportion of fuel carried in the Navy now to power developed, is so very small, even as compared with the days when it was everywhere thought very small, that I can hardly understand how we can expect our great and costly vessels to perform that service to the country which we should naturally expect of them after spending a million of money on a single ship. I hardly see how they are to perform that service with anything like continuity or efficiency with the small coal supply which they now carry unless some method of supplying them at sea is provided. I wish I could have believed that with respect to this third operation the author of the paper had been as successful as I consider he undoubtedly has been in the other two cases, but I cannot feel that that is so. I still feel that the problem of coaling our men-of-war at sea is unsolved.

Captain MACLEAR, R.N.: I am sure we are all agreed that the difficulty of coaling is a weak part of our naval power, and all naval Officers will welcome most heartily anything that can tend to remove that difficulty. I will only at this moment deal with one or two things that struck me about the method of coaling from colliers, which is admirable in theory; but we must recollect that there is always a motion of the ship backwards and forwards, the ship or collier will be always forging ahead and there will be a roll. And we must not expect that anything so rigid as that shoot appears to be will be able to keep up a continuous supply of coal, it will frequently have to be adjusted, and therefore it will not be able to supply the ship in the time that it would if it were on shore or in the basin. I think the quickest coaling in the world is done at Aden by men, and the very reason of the rapidity of coaling there is the pliability and adaptability of the men and the small baskets; they can be directed to any part of the ship at once, wherever it is wanted. In men-of-war, especially, we have a number of small bunkers distributed everywhere about the ship. We cannot, therefore, supply the coal in one mass on the deck; it will have to be distributed over a large surface and quickly stowed. There is our difficulty. Therefore I think one or two tubes, delivering in only one or two parts of the deck, will not coal a ship in the time that would be effected in a basin, and with wide open bunkers. For rapid coaling we require a small stream of coal directed to each bunker hole.

Mr. HENRY ADAMS: Although this subject is of much interest and importance, it is one rather difficult to discuss, because the special features of the author's proposals have not yet been put to the test of actual work in coaling ships afloat. I have had considerable experience in the working of machinery for handling coal, including one-third of the seaborne coal brought into the port of London during the last twelve years, and I know the many difficulties that there are in manipulating it. Welsh coal, particularly, is a most unmanageable material; you find in it lumps varying from 1 to 2 cwt., or more, and in some instances I have known lumps measuring 2 feet high, which have become blocked under the yoke of the shoot and prevented the run of the coal. If the coal were at all approaching the character of grain all difficulties would vanish: it would be dealt with as readily as oil or other liquid fuel might be. Another point with regard to handling coal is the hulk out of which it may be taken. The time occupied in delivering any quantity of coal depends very considerably upon the hulk at which you are working: for instance, in unloading 60-ton barges by crane, the best work averages only $3\frac{1}{2}$ tons per man per working hour, exclusive of the time occupied in shifting the barges. But, as showing what coal fillers can do, on the 21st of January last, at the Royal Victoria Docks, London, one gang of eight men at one crane discharging from a screw collier (s.s. "Dawdon") delivered 641 tons of gas coal in twelve hours, except a small quantity of 45 tons done by another gang while the first gang was at dinner. That equals $6\frac{1}{2}$ tons per man per hour in long-continued work, while over

a short period of two or three hours about 8 tons per man per hour can be done ; so that the author is probably within the mark in saying that 7 tons per man per hour can be loaded if the circumstances are sufficiently favourable. With regard to this arrangement for the coaling of ships from steam colliers, I do not quite see how the coal is to be brought from the ends and corners of the holds to the elevator. To trim from those points by hand would be almost an impossibility at anything like reasonable cost. As to the angles of the shoot, it is found that 36° is the minimum at which shoots can be depended upon to deliver coal in all weathers. I think the author deserves great credit for the time he has spent upon his paper and the ingenuity he has shown in his designs, and I thank him for the opportunity of being here this afternoon.

Captain CURTIS : I might say it was not unusual in the French war for transports to unload alongside sailing vessels, but then the ships could form a lee with their sails to keep the ships steady.

The CHAIRMAN (Admiral Colomb) : It is usual before calling upon the reader of the paper to answer the questions that have been put, and to offer his explanations, for the Chairman to make some remarks upon the paper and upon the discussion. My own view of the value of this paper is that it is from a gentleman who is very well acquainted with the moving of coal. We may have speculative papers here sometimes on these questions, but so far as Mr. Rigg is dealing with the question now, he is dealing with what he really understands, and therefore I think it is a very good thing, even if it went no further, that we should have the paper of such a gentleman in the pages of our Journal. I think myself that, considering that the mass of our coaling at home in European waters has to be done through the double process of emptying coal into bags and then emptying it again out of those bags, or, in case of colliers alongside ships, that we have to fill the bags on board the collier and pass them filled into the man-of-war, and then distribute them afterwards and empty them, it seems almost obvious that any appliances which tend towards getting rid of these processes tend towards a proper result. And I cannot help thinking that, even so far as the elevator shown on Diagram 7 goes, it is not at all impossible that simply as a matter of economy, without going into the question of speed, for Portsmouth and Plymouth, for instance, a great deal of economy might be reached by means of one of those elevators. Instead of, as at present, passing the coal into lighters in bags and then into the ship in bags, and then emptying them again afterwards, it would be only necessary to discharge the loose coal into the lighters in the harbour, to tow out the lighters and elevator alongside the ships in the Sound and at Spithead. I take it it is quite on the cards that a considerable economy, both in money and time, might be effected. The cost of the apparatus, as far as I understand, is not anything very serious. Coming to Diagram 8, which is, of course, the crucial one, I think myself that there is something in what the lecturer has said as to the possibility of coaling on an enemy's coast when the process is quick. If it were a very long process it might be difficult for one of our ships to take a collier and go into such smooth water as is to be obtained on an enemy's coast, under islands and headlands, and so on—it might be difficult to undertake that because we might suppose that the enemy would have time to bring down guns or something to annoy you in the process. But if it should turn out that, by appliances of this kind, coaling where smooth water is required could be done with great rapidity—in a very short time—I conceive that it is a thing that might be attempted. We should chance it that the enemy would not be able to bring guns down in the time, and that the coaling would be done before they could do so. But of course that is more or less speculative. But there is certainly that clear point which we got hold of in the manœuvres last year, and that is that either you will require for our fleets, even for that sort of work, a number of smaller colliers, or else that the large colliers must be furnished with some means of much more rapidly discharging than they have at present. And it is quite a question, in my mind, whether, considering that the cost of an apparatus of this kind would not be very great, whether it would not be worth spending 800*l.* or 1,000*l.*, or whatever it might be, to carry out that experiment, to see how far that rapidity of work which the lecturer promises might be got at. I think that is the way we have to look at it. We cannot expect to jump to conclusions on these matters. It must be done tentatively, and when you

have a paper of this sort from a gentleman who is practically acquainted with the matter and has made the machines which he proposes to modify for coal, it is worth while thinking as to proceeding to experiment with it. I shall now ask the lecturer to answer the questions which have been put to him.

Mr. RIGG: I will take the questions that have been raised in the order in which they occur. With regard to that of the ship's time, undoubtedly credit must be given for economy in that respect, and it is considerable in large vessels. In merchant vessels it might be accepted as about 30% a-day, and I have taken no credit on that account, but have simply dealt with the financial aspect of the question as influenced by labour and the introduction of machinery, and as this immediately affected the coal that had to be handled. With reference to the shoot shown in the Diagram, Fig. 8, Captain Curtis observed, I think, that it was at an insufficient angle to deliver by gravity. That is perfectly true, but my statement in this paper was, and experience has proved it over and over again, that an angle of 45° is the one for the delivery of coal from end-door railway wagons. Coal will not leave at 40° , but it passes freely from the wooden floor of a wagon at 45° . This, however, does not apply to these shoots, which are of steel, and I might enter into questions of minor detail upon these angles, but this would not perhaps now be to the point; they are less than 45° , and I think I can confirm Mr. Adams's remark from experience that coal loaded under these circumstances would pass well at 36° , when it has an impetus at the head as upon leaving a wagon. Of coal screens I have made very many at about 32° . The question of this angle is of the utmost importance.¹ With reference to the "conveyor" or "belt," I am quite familiar with these. They work very well in grain and there are many of them, those who employ them having extremely good reason to appreciate their value. They perform their work with the utmost success for grain, but I am not aware that canvas belts are used for coal, nor do I think that they would be suitable. I know cases where wire rope belts are employed, and many others at collieries in the Midlands and South Wales where flat-linked chain belts of iron and steel plates are used, passing over drums for conveying coal to considerable distances from screens for delivery into boats and railway trucks; they work very well. I quite appreciate Sir Edward Reed's observations with regard to the first and the second of the methods which I have described, and in answer to a question that has been raised with reference to their actual employment and that they were arrangements or contrivances or proposals, I would again mention that this second has been in actual operation, and here is a photograph of one I sent out to the Black Sea. It is not, therefore, simply a proposal or scheme, and the statements made are facts and not merely calculations, but results based upon observations I have made when on board this elevator on various occasions. The principal difficulty, I think, which Sir Edward Reed indicated was one rather that affected the question of bringing one vessel alongside another. It was not so much a criticism of my proposal here to raise coal by mechanical means, which I believe to be extremely economical in consequence of the ship's winch performing the work, I have no kind of doubt, because the engines on board this elevator were the same size as nine out of ten of the steam winches which would be found ready at once for application to this arrangement of gearing, which I could not in greater detail show in these general drawings. I have no doubt whatever that the ordinary winches will be found capable of driving these elevators. Upon the question of coming alongside I confess I do not feel myself competent, in the presence of so many naval Officers, or even in their absence, to form an opinion upon this matter, or to contend against an opinion opposing the suggestion. But if there is nothing better before the country than the proposal I make here, why should it not be adopted? I think that criticism of this should be accompanied by a suggestion of something better. I mean with regard to the bringing of vessels alongside each other in comparatively smooth water, as described. It is quite true that if no substantial objection is raised to what I will call my mechanical proposal, there will be no difficulty at all in prolonging this shoot considerably, so that the vessels should not

¹ A reference made to drawings since this discussion took place shows that the average angle best suited to fixed screens at collieries is 22° .—J. R.

be allowed to come so near to each other. They might be some considerable distance apart and we could still put the coal on board and use the machinery exactly as I have provided, if there is any real objection to bring vessels alongside in that manner. I have very little doubt, and many others are of the same opinion, that liquid fuel will eventually be adopted in the Navy, but surely that is no reason why an efficient method should not be applied to the coaling of the Navy as we have it. We have not now a liquid fuel Navy, but one which takes coal on board, and under circumstances of considerable difficulty. Our object is to facilitate the method by which the coal is put on board. It is not before us now to consider the best method of putting liquid fuel on board, therefore I think it is premature to consider that, and a discussion of that question at the present time will not advance the matter. The importance of this question has been acknowledged generally, as well as by this meeting. Now, with reference to a remark from Captain Maclear about the question of carrying the coal across a ship. This illustration (Fig. 8) that I have prepared is not for one moment to imply that this collier shall be used for this purpose, excepting if she were in port: but she is not in port: it is merely intended to show that it could be done if she were. This long shoot might have been shown in dotted lines, and such importance would not then have been attached to it as has been since it appears in full lines. I further understood that Captain Maclear had an objection to placing the coal on the deck of the vessel, because it was desirable that it should be received in different bunkers at the same time. No doubt it is very desirable, and I have provided a means of putting it on to four parts of the vessel simultaneously from one of these steam colliers, two elevators being placed in the forward and two in the after holds, and there is no doubt that there should be more than one collier—two, three, or four, or a number corresponding to the vessels in the fleet. Now, assuming that two of these steam colliers are placed one on either side of a man-of-war (Figs. 9 and 10), each elevator is a separate and distinct machine, and it can be set independently in operation by means of clutches upon the same shaft, thus. There are two clutches upon the shaft for driving the two elevators: one is delivering into one part of the ship, and there is no reason why the shoot attached to the next elevator should not deliver into another part of the vessel. The South Wales coal, which Mr. Adams referred to, is larger than any other coal in the country. I am very familiar with it, and if these elevators were adopted, though we readily acknowledge the importance and necessity of keeping the coal as large as possible, because it drops to about one-sixth of its value when reduced to slack, it would be absolutely necessary, if this mechanical method of loading is adopted, to deliver the coal on board the colliers something smaller than the pieces which I have seen in Glamorganshire and the South Wales coal district generally—it would have to be delivered of a size that could be loaded into the elevator buckets or trays. I am extremely glad to find the confirmation which Mr. Adams's experience at the London Docks gives of the information I obtained as to loading coal per man in Liverpool; the quantities are evidently about right. The Chairman suggested that the floating elevator might with advantage be used at Portsmouth. Though I am not well acquainted with that place, I should think, from the calculations based on these statistics, that is exactly a case for one or more. If coal is there loaded from lighters there is no kind of doubt that an elevator could be adopted, and that there would be a very great economy in its use. I am much obliged to you for having listened to the paper and to the observations I have now made.

The CHAIRMAN: It is now my pleasing duty to ask you to return your thanks to the lecturer for his excellent paper. We are always very gratified when the outside world, as it were, come to enlighten us on subjects which they themselves are more closely conversant with than we are.

Wednesday, July 3, 1889.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B.,
G.C.M.G., &c., &c., Adjutant-General to the Forces, in the Chair.

THE PNEUMATIC TORPEDO-GUN; ITS USES ASHORE AND AFLOAT.

By Captain E. L. ZALINSKI, 5th Artillery U.S. Army.

The CHAIRMAN: I think we really owe Captain Zalinski an apology for the smallness of the audience. It is not often that we have to find fault with those who direct the affairs of this Institution. But, I think, in the present instance they are somewhat, if not very much, to blame, for not having postponed this lecture until after the Shah's visit to the City had taken place, and the various ceremonies that are to occupy this week had been got through. I am quite certain, had it been any ordinary time, Captain Zalinski would have had a very crowded hall to lecture to, and, for myself, I am sure I echo the feelings of all who take an interest in this very important subject, when I say that I hope that he will pardon the Institution for the small audience that he is called upon to speak before this afternoon. I have no doubt that all present know Captain Zalinski well by name, although you may not have had the honour and pleasure of meeting him before, I feel that he deserves a warm and cordial reception from the Officers of the Army and Navy, and from all the members of this Institution for many reasons; first of all because he is an Officer in the Army of the United States, secondly, because he is the inventor of a very wonderful implement of war, which most probably is destined to certainly influence, if not revolutionize, warfare in future, both on land and sea. But still more he deserves our cordial greeting because he comes from a kindred nation on the other side of the Atlantic, and we are always prepared here and elsewhere in all societies where English gentlemen meet together, to offer to all that come from thence a cordial and hearty welcome.¹

COINCIDENT with advances in the arts of civilization we find rapid advances in the arts of destruction. Appliances for attack are met by new defensive appliances, and these again by more powerful instruments of destruction. Neither the attack nor the defence are long permitted to retain an absolute superiority.

At the present date the gun has practically overpowered the armour which may be carried afloat. The portion of a ship which can be protected from the high-power guns of even medium calibres is now reduced to a mere citadel, and the whole question of armour has therefore completely changed since the days of "La Gloire" and

¹ [Note.—The day for reading this paper was fixed by the Council, with the concurrence of Captain Zalinski, and the arrangement could not afterwards be altered.—GEORGE ERSKINE, *General, Chairman of Council*.

See also the remarks made during the discussion by Admiral Boys, Vice-Chairman of Council.]

the "Warrior." The mere momentary supremacy of the armoured protection of the over-water hull led to greater activity in the development of the submarine torpedo attack. This having been brought to a point where it has necessitated consideration, the under-water hull has been strengthened somewhat, and cellular subdivision renders the relatively small charges used heretofore in movable submarine torpedoes ineffective. Now, however, we are presented with the pneumatic torpedo-gun, which is capable of accurately throwing very large charges of high explosives to greater distances than those attainable by movable torpedoes. Again, it becomes a question whether the under-water hull, as it is made to-day, is not overmatched. Perforation of the over-water hull by ordinary projectiles is likely to produce only local injury. The perforation or the crushing-in of the under-water hull is more certain to be fatal, the more heavily the ship is weighted with armour. As to shock effect on machinery and propeller shafts at distances beyond the crushing-in radii, we have little experience; but there appears to be every reason to believe that a great source of danger to the ship lies in this new method of attack. Consideration of this indicates that the new weapon must become an important factor in the design and equipment of defensive structures and, hardly in a less degree, in those intended for aggressive action.

Time will not admit of giving all of the details of the system nor all of the steps in its evolution. I am provided with lantern slides and diagrams with which I shall be pleased to exhibit such details as you may desire to know more of.

A brief history of the inception and evolution may not be uninteresting in connection with a description of the system. Whilst I have been honoured by having the invention of the gun ascribed to myself, the person to first propose using compressed air for the propulsion of high explosives was Mr. Mefford of Ohio, and he put it into the first materialized shape in the construction of the 2" gun in 1883. My attention was turned to it in the winter of 1883-84, and I was asked to express an opinion regarding it. I unhesitatingly replied that I did not think it practicable to throw very large charges of high explosives considerable distances with compressed air. Being assured that the 2" gun had thrown a projectile to a range of 1 mile, I consented to test it, with the concurrence and assistance of my Commanding Officer, Colonel John Hamilton, 5th United States Artillery, now retired. Without this assistance the pneumatic gun would hardly have been developed as a practicable military machine. Mr. Mefford's ideas were as crude in character as was the machine which he presented. As a subaltern, I could not have carried on the experiments at a military post, and it would have been difficult to have carried them on elsewhere. Our own authorities with whom rest the selection and adoption of war appliances were too sceptical regarding this weapon to experiment with it. It is thus largely to the broadness of character of Colonel Hamilton that the pneumatic gun, as it is to-day, became possible. My own initial scepticism regarding the use of compressed air as the propelling power enabled

me to receive the scepticisms of other military men regarding the pneumatic gun with less impatience—with more tolerance. Convinced that it was of special importance to the United States, no efforts were spared to push it to a definite successful conclusion.

Following the 2" gun came consecutively in construction the 4", 8", and 15" guns, views of which I will now present. At the present time ten 15" guns are being constructed of the type shown in the views. You will observe that whilst the 15" gun already constructed is trunnioned at the breech, those now building are trunnioned towards the centre, being thus nearly balanced. One of these last-mentioned guns is for the Victorian Government, and is to be tested at Shoeburyness; the others are for the United States Government. The general characteristics of these guns and their accessories are as follows :—

The Gun.

The gun-barrel consists of a very light tube, at present a smooth-bore. As the firing pressure used does not exceed 1,000 lbs. per square inch it need not be more than half-an-inch thick, even in calibres as great as 20 inches, if made of steel or aluminium bronze. A greater thickness has been used in the 8" and 15" guns, for the purpose of obtaining somewhat greater rigidity and to lessen the chances of mechanical injury in transportation and manipulation. Where it is important to eliminate weight, as on shipboard or torpedo-boats, these tubes can be made very light, especially in cases where they are placed at a fixed angle. When the machine is to be movable for elevation or direction, or both, the barrel is supported on a suitable truss, and this in turn is supported on a gun-carriage similar to those used for sea-coast powder guns. The breech mechanism is a simple gate arranged so that the valve mechanism cannot function until the breech is closed and latched.

The Valve.

The valve is known as a "balanced valve," so arranged as to open and close by a single movement of the operator. The *time* of opening and closing can be varied by an adjusting device so that any desired loss of pressure will ensue. In this way the range can be changed without change either of elevation or pressure. The valve setting can be constantly changed to conform to the variations of range much more quickly and accurately than can be accomplished by corresponding change of elevation of a gun. The pressure in the reservoir is reduced at each fire by any predetermined amount, the valve being adjustable to accomplish this automatically. The most economical results are obtained with the air acting expansively. A loss of 12 to 15 per cent. with a reservoir of five capacities of the gun-bore is ordinarily the maximum which can be used with advantage.

The Reservoirs.

The air reservoirs used thus far consist of wrought-iron lap-welded tubes of $12\frac{3}{4}$ inches and 16 inches outside diameter and from $\frac{1}{2}$ to $\frac{3}{16}$ inch thick. These tubes are from 18 to 25 feet in length. The reservoir tubes from which the air for firing is directly drawn are known as the "firing reservoir." This reservoir will, as a rule, be of five capacities of the gun-bore. Reservoirs are now being made of steel ribbon tube, resulting in marked reduction of weight; the steel ribbon is wound spirally on a mandril, and the successive layers are wound in opposite directions, breaking joint and soldered together.

Where it is desired to fire a large number of rounds with great rapidity, an auxiliary storage reservoir is used, into which the air is compressed ordinarily to twice the pressure to be used in the gun. Thus the gun can be fired as rapidly as the shell can be inserted, and the piece properly pointed, for the number of rounds for which storage reservoir capacity is provided.

The Compressors.

The air compressors may be of any type capable of giving the required pressures. We have used the compressors of the Norwalk Iron Company. These compressors perform the compression in two and three stages, there being intermediate cooling in passing from the first compression to the last.

The Shell.

Two general classes of shell are used, viz., full calibre and sub-calibres. The full calibre shell is retained in its proper trajectory by a tubular tail piece having affixed thereon spiral steel vanes. These vanes serve to rotate the shell and keep it point foremost. The sub-calibre shell may be of any diameter smaller than the bore of the gun; they are kept centered in the bore by an attached gas-check of the full size of the bore, and by centering pieces attached to the body of the shell near the conical point. These are loosened from the body by the air pressure, when the gun is fired, and leave the projectile when clear of the muzzle. The projectile is retained in its trajectory by short spiral vanes, attached to the rear of the shell, of sufficient width to nearly touch the surface of the bore.

In this way, shell of 6", 8", 10" and 15" calibre carrying charges of 50, 100, 200, and 500 lbs. of explosive respectively, are fired from the 15" gun. The smaller diameter of shell can, of course, be thrown a greater distance, as they weigh less and offer a smaller resistance in passing through the air, whilst they receive the same energy from the gun. Where it is desirable to throw any given charge a fixed maximum distance from a gun shorter than the normal length for the calibre, the same results may be obtained by making the gun of a larger diameter proportioned to the desired shortening of the gun barrel, and using sub-calibre shell. This will be of value for use on

shipboard where the available space may be limited, and has the great additional advantage that very large charges may be thrown out of the same gun when coming to closer quarters. In all shell, the bodies are kept from metallic contact with the bore by non-metallic centering pins and bearings, to avoid danger of heating the charge on friction. It is important to retain the centre of gravity of the shell somewhat in front of the centre of figure. This renders it necessary to construct the shell of a greater weight than would otherwise be required. Except for this, the shell could be made of as light tubing of brass, iron, or steel, able to withstand the crushing stress due to the aggregate air pressure upon the gas-check, and the set-back of the charge.

The Fuze.

As this part of the system is somewhat novel, I will describe more fully the steps which led to its development.

The earlier experiments with the pneumatic gun demonstrated that the ordinary fuze arrangements were insufficient to obtain the best results with high explosives. Ordinary percussion fuzes of fulminate of mercury were used at first, being placed in the point of the conical head. These fuzes did not act uniformly, and some failed to explode the charge. Further experiment with copper capsules of fulminate demonstrated that whilst some would explode upon very slight percussion, others would be entirely upset and deformed without resulting in explosion. This occurred with the most sensitive ones obtainable. Another noticeable fact was that shell charged with 17 lbs. of dynamite, having the percussion capsule in the front, upon striking and exploding on the shores of Fort Hamilton, sometimes failed to produce any marked effects. This result was very unexpected, but, upon consideration, it was assumed to be due to the initial point of the explosion having been in front.

It was assumed that as *time* was required for explosion of the entire charge—the gases evolved by the explosion of the layers in immediate contact with the target tended to throw *back* the gases afterwards evolved from the portions of the charge in rear. It therefore appeared desirable to make the initial point of explosion at the *rear* portion of the charge, and to prevent an explosion at the point from simple impact; that the explosion must be made to take place an instant *before* the body of the charge had actually struck the target. It furthermore appeared necessary to devise a fuze which, while not abnormally sensitive to explosion from shock when in the bore of the gun, would act upon the slightest touch when striking the target, and that its point of initial ignition could be placed at any desired point within the charge, or could be made to occur, simultaneously, at a number of points. In view of the unsatisfactory experience with ordinary percussion arrangements, it occurred to me to call to my aid the electric current, to enclose a small battery in the shell with suitable circuit arrangements and electrical primers.

The fuze problem presented great difficulties as the requirements appeared conflicting. These were:—1st. That in striking a rigid target, such as the side of a ship, the circuit should be closed an instant *before* full impact of the projectile; 2nd. Missing the ship and entering the water, that *explosion* should take place an instant *after* striking, so that the charge might be fully buried in the water and produce its maximum on the enemy, if within the effective danger radius; 3rd. Failing in this, to explode after reaching the bottom, and so that this last action may take place at will, without the other; 4th. To cause the circuits being certainly open until after the shell has left the bore of the gun. The problem presented for solution was found intricate and difficult. Very many practical difficulties had to be overcome. These have all been eliminated and the manifold and apparently diametrically opposite modes of action have been successfully obtained.

As soon as a suitable battery had been selected arrangements were made to try

experiments upon iron plates, to determine the best details of arrangement of the charge and of fuze. The following experiments were tried :—A target was constructed of iron plates. The plates were supported against the interior parade wall, and the gun was placed outside of the fort at the sally-port sixty yards from the target.

A blank shell charged with sand, total weight 30 lbs., was fired. It penetrated three plates, aggregating 2·5 inches. A similar shell, charged with dynamite, having no fuze, intended to explode on impact, penetrated only a single plate, and its effect was actually *less* than the blank shot previously fired. Another shell fired with a detonating fuze in the front of the charge did little more damage. An electrical fuze was then arranged so that the circuit should be closed just before the body of the shell came in contact with the target. The primer was placed in the rear part of the charge. To further ensure against premature explosion by simple impact, a layer of cotton waste was placed in the front of the shell. The resulting explosion was the most effective produced : the six plates of the target, aggregating 4·5 inches, being broken through and indented over a nearly circular area of about 18 inches diameter. The stone wall in the rear was also somewhat broken by the shock.

It was evident, from the results obtained, that the effects to be produced by the explosion of the dynamite shell would not be limited to simple puncturing of a target, but that it would produce cracks and breaks at points distant from the point of impact. This was shown in some experiments upon a stern-post of the steamship "Nankin," forging about 5 inches by 8 inches in cross section; charges of 3 lbs. were exploded upon it. They simply dented the piece at the point of placement, but broke pieces of 2 feet in length at the extremities 6 feet and 8 feet distant, and produced large cracks at other points.

The electrical fuze consists of four parts, viz., the electrical battery, the circuit-breaker, the low-tension igniter, and the detonating cap. If delay action is required, a slow-burning train is inserted between the igniter and the detonating cap.

The chloride of silver battery has been selected as being most suitable. Although the electromotive force is low, the internal resistance of the battery, as made, is very low, and a single element suffices to bring the bridge to a red heat. To provide against accidental increase of resistance in the circuits, and to reduce the *time* required to fire the primer, one set of batteries is made quadruple, the other two sets are double. Each set is arranged in series. All of the elements of the quadruple battery are wet with salt water or sal ammoniac before insertion into the shell. One pole of this battery is connected, through the primer embedded in the fulminate of mercury detonator, to the metallic body of the shell; the other pole is connected with a light copper cone fixed in the conical point of the shell, and insulated therefrom. The shell striking any solid target, either normally or otherwise, will cause the outer shell to crush in on the insulated cone, close the wet battery circuit, and explode the charge.

A double dry battery is placed in the point and at the rear end. This last is inserted as a matter of precaution rather than absolute necessity. One element of each of these double dry batteries is wet up, and is ready for action as soon as the salt water enters the other element. Upon the shell entering the water the dry element becomes wet: the current then passes through a primer, which ignites the detonator. The time train is adjustable so that a variable submersion before explosion can be obtained. The rear dry battery acts in the

same manner should the other fail. If it is desired to cause the shell to reach the bottom before exploding, a water cap is attached to the dry battery in point of the shell. Provision is made to protect the front and rear batteries from moisture until the shell has left the bore of the gun. A spring valve is placed over the front dry battery to keep out accidental moisture. This spring is made rather stiff, as it is found that the impact with water is sufficient to open it, and it was desirable to provide for the contingency of the gun barrels on ship-board being filled by the waves with water. But if filled when the shell is fired, these valves would open and admit water to the battery and make it active. The shell would then explode shortly after leaving the muzzle. As this is not desirable, an independent circuit-breaking device is introduced, which causes the circuit to close only after striking the water.

For countermining and for action against earthworks, the collapsible head is omitted, and a delay action time train may be inserted. For action against earthworks, a wet battery is substituted for the dry battery in the point or base. The circuit-breaking device ensures all circuits being retained open until the shell has left the bore of the gun. If anything should be amiss with the circuits, no explosion will result until the shell is some distance beyond the muzzle. This, however, is impossible if proper care is taken in making up the shell, arranging the circuits, and testing. The circuits can be tested at any time before inserting either the batteries, primers, or detonators. The batteries, primers, and detonators need not be inserted until just before using. A double set of circuit-breakers, primers, and detonators are used to increase certainty of action.

To guard against the chances of breaking the very fine filament of platinum wire constituting the bridge, it is embedded in a cake of compressed gunpowder or other solid material with suitable priming around it.

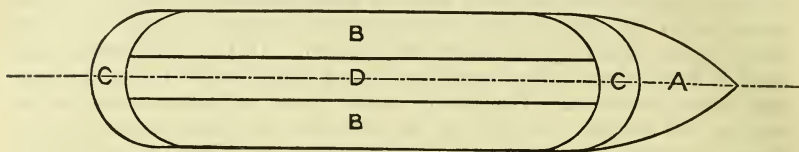
The Charge.

The charge used thus far has been uncamphorated explosive gelatine, having a core of dynamite. This core is for the purpose of producing a complete detonation of the less sensitive explosive gelatine. I would have preferred for this purpose compressed dry gun-cotton, as cold weather does not affect its properties as a detonating substance. With dynamite also there is great danger of exudation of the nitroglycerine when the charge remains in a fixed position for any length of time. The liquid explosive gravitates to the lower side of the charge and finally exudes. This of course is extremely dangerous.

The arrangement of the charge is essentially as shown in the diagram. At the front and rear of the charge I would use camphorated gelatine to increase the chances against explosion by shock, both in starting the shell and in striking the target. For this latter purpose also a diaphragm is placed so as to stop off the charge some distance from the point. This will give time for detonation of the

charge at the *rear end* before the front can be exploded by shock. I have preferred the uncamphorated explosive gelatine because it gives the maximum explosive energy for a specified volume of shell, both on account of its very great energy and its high specific gravity.

DIAGRAM OF ARRANGEMENT OF CHARGE.



- A = Empty space at point.
 BB = Uncamphorated gelatine.
 CC = Camphorated "
 D = Gun-cotton.

The energy compared to dynamite No. 1 is as 142 to 100, according to General Abbot and other authorities. Its specific gravity is 1·6 compared to 1·2 of dynamite Nos. 1 and 10 of gun-cotton. Thus, in a given volume of shell the explosive energy, where uncamphorated explosive gelatine is used, will be as 189 is to 100, when compared with the same volume of dynamite; compared with *dry* gun-cotton, it would be 263·100 or close on to two and five-eighths time the explosive energy. If *wet* gun-cotton is to be used there is a strong probability of the relative strength being greater. I am aware that there is some question as to relative strength of gun-cotton as given by General Abbot, and it is possible that the gun-cotton may be made denser, but it is seen that a large margin must remain in favour of the explosive gelatine.

It will rest with each Service to select that explosive which seems to it safest and best. I mention my own reasons for having selected and used uncamphorated explosive gelatine. I have used this for more than three years. It was made at the Nobel Explosive Company's Works near Glasgow. I have fired two tons of this. Besides use in the gun, I have subjected it to various tests of alternations of heat and cold, as well as subjecting it to very severe shock. I am satisfied from this experience that, if well made, and stored in a dark magazine of equable temperature not exceeding a maximum of 80°, it is not subject to deterioration whilst in store, or to explosion by shock if handled as carefully as gunpowder. The only thing unfavourable that I have observed, and that rarely, is a very minute exudation of nitroglycerine after freezing and again thawing. I propose to meet this contingency by having the cartridges made up in discs having a central hole for the detonating disc of gun-cotton. These large discs are to be covered completely by a rather thick covering of asbestos paper or other absorbent material having incorporated therewith an alkaline substance, such as carbonate of magnesia, or any exudations of nitroglycerine will be absorbed by the covering; any free acid which might be present or develop in the exuded nitroglycerine will be neutralized. Besides this, the thick non-conducting envelope will partially protect the explosive from great alternations of heat and cold.

Effect of Explosion of Torpedo Shell.—The torpedo shell has a double field of action, the over-water hull and the under-water hull.

There are very few if any complete experiments which show what large charges of high explosives will effect, either against the armour or the general over-water structure of a ship. The elements of suitable tamping and proper method of explosion have been omitted. The Scandinavian experiments quoted by General Abbot give us an approximate formula: $W = 3\cdot3d^2$ where W = weight of dynamite

No. 1, d = thickness of wrought-iron armour. This will give a perforation or rather breaking through, where uncamphorated explosive gelatine is used (taking this at 142 as compared to dynamite No. 1 at 100) as follows :—

55 lbs.	4·8 inches.
100 "	6·6 "
200 "	9·3 "
400 "	13·2 "
500 "	14·7 "
600 "	16·0 "
700 "	17·4 "
1,000 "	20·4 "

Experiments indicate that the decks of the most heavily armoured ships will probably be vulnerable to the 8" torpedo shell charged with 100 lbs. of explosive gelatine, and even the smaller shell will break through. The torpedo shell charged with 500 lbs. will break through a very large proportion of the more heavily armoured parts. The decks and lightly armoured parts present a much larger proportion of the over-water target than the parts carrying more than 14 inches. When exploding against the more heavily armoured parts and failing to perforate, much damage will probably be incurred by the very great transmitted shock. This will seek out the weaker parts, and produce fractures at points some distance from the point of impact and explosion. It will also break up the hydraulic and steam mechanisms upon which the life of the ship now depends, and will place the personnel *hors de combat*. Where the explosive energy is greater than the resistance offered by the target, the result is something greater than a mere perforation. There is a general breaking in of the surrounding parts of the structure.

Should it be considered advisable to make the over-water hull, in its heaviest armoured parts, the objective point of attack for these torpedo shell, pneumatic tubes can be built to throw any charge requisite for breaking through, even if experiments demonstrate that a shell containing one ton was required to perform the work. But the work of attacking the over-water hull will be left to the high-power powder guns. I have only endeavoured to show that the torpedo shell is likely to produce much injury to the over-water hull, should it miss the real objective point, the under-water hull.

Regarding the effect of the explosions, when occurring under water there appears to be less question, except as to the size of the charge. Up to recently, less than 100 lbs. of gun-cotton have been considered sufficient. A natural sequence of the general use of automobile torpedoes, such as the Whitehead, has been the strengthening of the under-water hull, at the same time increasing the cellular subdivision. This renders large charges desirable. The pneumatic torpedo gun system makes this perfectly feasible. It is simply necessary to establish the size of the charge to be thrown.

According to General Abbot, the explosion of 100 lbs. of explosive gelatine under water would be effective against a first-class war-vessel at the distance of 21 feet. More recent experiments indicate that this distance is too great. Lieut.-Col. J. T. Bucknill, late R.E., in a series of articles published in "Engineering," takes the danger radius of the same charge as being about 10 feet. This difference is partially due to the great strengthening and subdivision of the hull made necessary by the development of the auto-mobile torpedo. Whilst General Abbot assumes a pressure of 6,500 lbs. per square inch as fatal, Col. Bucknill assumes it at nearly twice this as being requisite.

The effective horizontal range of a 100 lb. charge would be at least 15 feet, whilst a 500 lb. charge would probably be about 50 feet.

If the explosion takes place at a somewhat greater distance than this, although the result would not be fatal, there is very great chance of the steering gear, shafts, and propellers being seriously injured and the vessel being rendered helpless to continue manœuvring, which is perhaps the condition to which one would most wish to reduce one's enemy. A shell striking, say, 100 feet from the target is likely to be within effective danger radius at the time when the explosion takes place, owing to the delayed action of the fuze.

Accuracy of Fire.

The question as to whether the pneumatic torpedo-gun can deliver accurate fire appears to be settled by the trial before the Naval Board in June, 1886, and the destruction of the "Silliman" on September 20th, 1887, as also in the test of January 26th, 1889. In the first case four out of five shell landed in essentially the same spot at a range of 1,613 yards—the other shell went about 7 yards beyond.

The lateral dispersion was slight. The destruction of the "Silliman," on September 20th, 1887, will be described later on.

On September 30th, ten shell were fired for rapidity and grouping. I was requested not to make any allowance for the variable conditions of wind. The gun was set at zero, although the wind was variable both in direction and force, and I could have changed the direction of the gun whilst loading, without loss of time. The men I had could not be called trained men. Ten shell were fired in 10 minutes and 45 seconds. Had the "Silliman" been anchored end on, the bow or stern being at the buoy taken as a target, two of these shell would have struck the vessel directly, and four have exploded near enough to have destroyed the ship. Two others would have injured her seriously by the explosion.¹

In the trial of the 15" gun before the U.S. Naval Board, of which Commander Goodrich was President, the contract requirement of landing 50 per cent. of shell fired in a rectangle 150 feet long by 50 feet wide, at a distance of 1 mile, was exceeded.

The following extract from the report of the Board is pertinent:—

"The method of graphic analysis employed to ascertain the effect produced by the groups of shell fired at the three principal ranges shows that a moderate sized ship, broadside on, whose centre was anywhere between the limits of 1,988 yards and 2,218 yards, would have been struck by from one to five projectiles, either above or below the water-line. If end on, her centre being from 1,946 yards to 2,248 yards removed from the gun, she would have received from one to seven of the nine shots fired. Again, were the ship an average iron-clad, 333 feet long, with corresponding draught of water, &c., she

¹ A British Commission witnessed both the "Silliman" experiment and the rapidity test of September 30th, 1887. Indeed, the last mentioned was made at its request.

would have received all of the nine shots, either above or below the water-line, when 2,097 yards distant.

"There is, however, another effect which ought not to be neglected, viz., the torpedo action of a suitably fuzed shell passing under the ship. As the lateral errors are insignificant throughout the various series, it is fair to assume that the chances of inflicting damage on a vessel, either way placed, are thereby materially increased. Since the 'Silliman' was destroyed in this manner such a supposition is logically admissible. Granting that it adds only one more chance to each phase, and we see that of the nine shots fired at 2,100 yards eight would have been effective against a 300-foot ship, end on, and distant from 2,015 yards to 2,126 yards.

"At the 1,700 yards range a similar ship, broadside on, would have been struck by from one to three projectiles, according as her centre passed over the space between 1,625 yards and 1,745 yards. On the other hand, if end on, she would have received an equal number when changing her distance between 1,574 and 1,786 yards; and the number of injuries received might be increased from one to two or from two to three within the same limits through torpedo action.

"At 300 yards range, a ship broadside on would have received from one to three shots between the limits of distance of 329 yards to 451 yards. End on, she would have received from one to two or from two to three shots between the limits of 298 yards and 482 yards.

"It appears finally, then, that projectiles either carrying or capable of carrying 200 lbs. of high explosive were thrown to distances varying from $1\frac{1}{4}$ miles to 90 yards, and that, at the ranges selected for grouping, viz., 2,100 yards, 1,700 yards, and 360 yards, not less than one-half of the projectiles fired fell in the same standard target with the trial shot."

"Silliman" Experiments.

Hon. Wm. Whitney, Secretary of the Navy, having asked the Pneumatic Gun Company what it was claimed that the 8" gun at Fort Lafayette could do at 1 mile range, the answer was given that it could destroy any ship then existing in the United States Navy—that if any stronger ships were constructed, the Company would guarantee to build guns capable of destroying them. One of the ironclad "Monitors" was asked for as a target, should a trial be determined upon.

As the trial must necessarily take place in New York Harbour, the question of the expense involved in removing the hulk, should it be sunk, caused the substitution of a condemned schooner, the "Silliman," as a target. This vessel was only 80 feet in length, and 22 feet beam. At the range selected, 1,864 yards, anchored with her masts in the line of fire, she presented to the gunner a very small target. Being without ballast, her destruction was more difficult than if of larger and stronger construction. Experiments made at Newport with a similar unballasted vessel placed over a gun-cotton mine resulted in but slight injury to the target when the explosion took place. Empty sealed water-tanks were placed between decks to aid in floating the vessel if struck, and chains were placed around the ship to facilitate removal. Her complete destruction was not expected.

After firing one sand shell and one blind shell, a shell was exploded in the water some yards from the ship, resulting in shaking out the mainmast. A second shell exploded directly under the ship, amidship, breaking its back, and destroying it completely. This was followed up by a third shell which struck the *débris* above water and exploded in the air, whilst a fourth shell was exploded in the water near the wreck. The first shell was purposely exploded some

distance from the ship, whilst the last two were only fired to show the full control of the range, and the power of reproducing results time after time. The programme of firing one shell near enough to shake the vessel up without destroying, the next to be exploded under the keel amidship breaking her back, and, finally, one on top, above water, was laid out by myself some weeks before, on being asked what I intended to do. But the announcement, when made, was received incredulously. I based my assertion on experience with the gun, and its ability to reproduce results where the shell was well made, and this last was the only proviso I put to the above statement.

The accuracy of fire follows from using an uniform air pressure which can be absolutely gauged to within a few pounds, instead of varying several thousand pounds, as may be the case with the gun using powder. With the same amount of energy imparted to the projectile, if the latter is well and uniformly made, and is well balanced, it must necessarily attain the same range. Unlike the ordinary round, smooth-bore projectile, it cannot ballot, as it fits the bore in at least three circumferential lines, distributed along its length. It must, therefore, leave the gun in the direction of the axis of the bore.

Before proceeding to the question of the various uses of the pneumatic torpedo-gun system, I will discuss two points which are frequently suggested.

Rifling.

To the professional mind, it naturally occurs that it would be well to resort to rifling, dispensing with the long and cumbersome tail. To rifle a projectile so long, and so low in density as the one in use, would involve an exceedingly rapid twist. According to Professor Greenhill's formula, a twist of one in thirteen is required for a cast-iron shell eight calibres in length. This will be about the average length of the dynamite shell without the tail, being, however, somewhat shorter in the larger calibre. The density of the charged shell will be much less than of the common iron shell. Hence it is probable that a twist of about one in eleven will be required. To impart so sharp a twist will put a very considerable torsional strain on the thin walls of the shell, as also on the (proportionately) equally thin walls of the gun. Again, the explosive will have to sustain an additional shock, due to the very high angular velocity imparted to the shell. There is very great danger from the heat which will be generated in the friction of the projectiles, whilst being forced through the gun bore.

Whilst, as an artillerist, my natural predilections were for rifling, consideration of the foregoing facts led me to make haste slowly in this direction. I had constantly before me the experience gained at the Proving Ground at Sandy Hook and in foreign services, where the not infrequent results of the experiments of firing the high explosives from rifled powder guns was a final dissolution of the gun.

Use of Gunpowder for Propulsion.

The feasibility of using gunpowder for the propulsion of shell charged with high explosives is continually broached. It has been frequently tried but *invariably with final disastrous results*, where the experiments have been carried up to moderately large charges. By *large* charges, I refer to shell charges, where the percentage of the charge to the total weight is not less than 33 per cent., so that charges of from 50 to 1,000 lbs. can be thrown, and, if requisite, even 1 ton.

The advocates, or rather the predictors of the use of high explosives from powder guns, also demand penetration before explosion.

If large charges are to be thrown, the shell must necessarily be made thinner, and it is very doubtful if it will then withstand the concentrated blow it receives upon striking the target, so as to penetrate even a moderate thickness of armour. The battering shell of the 100-ton gun contains a bursting charge of only 32 lbs. of gunpowder. It would seem that the walls of the shell would have been made as thin as consistent with ability to perforate armour, without breaking up. Assuming that 32 lbs. of a high explosive could be substituted for the gunpowder, it is very doubtful if it could be carried through heavy armour successfully before explosion. There is no record of large battering shell fully charged with gunpowder having perforated armour over 6 inches in thickness, without explosion until after perforation. On the contrary, explosion takes place prematurely, almost immediately upon impact, with the result of less injury to the target than that produced by an uncharged shell. Much more surely will this be the case, if a high explosive be substituted for the gunpowder as the bursting charge, unless the shell cavity is well cushioned. To do this involves reduction of explosive capacity. The energy available, after breaking up the very thick and tough walls of steel shell, will be but little greater than that produced by gunpowder. The effect as to material injury or man-killing power will not much exceed that producible by the shell charged with gunpowder.

In firing a shell from a powder gun the walls of the shell must necessarily be sufficiently strong to withstand the initial shock. This limits somewhat the capacity for bursting charge, even where armour-piercing is not sought for. If a high explosive is used, some cushioning device is requisite, and a further reduction of capacity ensues. Assuming that a shell charged with some of the high explosives can be thrown with safety from a powder gun under normal conditions of pressure, it is known that abnormal pressures, varying therefrom as much as from 5,000 to 12,000 lbs. per square inch, are not infrequent. This may be looked for, especially when the gun is warmed by continuous firing, and the projecting charge of gunpowder becomes quickly heated. In this condition, its dissolution must necessarily be more rapid, giving greater initial pressures. In addition to this the shell and the contained charge may become warmed by remaining in the hot gun-bore some little time before being fired. The high explosives increase very rapidly in sensitiveness by

slight increments of heat. If then, with this condition of increased sensitiveness, we have in addition an abnormal pressure, a premature explosion is very likely to occur. In rapid firing of powder-guns, when shell or shrapnel charged with powder are used, premature explosions of the shell are not infrequent. Much more will this be the case when the bursting charge is one of the high explosives.

In this connection another matter is to be considered. It is well known that high explosives are capable of producing more or less violent explosions depending upon the character of the initial shock of detonation. The more insensitive the explosive, the more powerful must be the detonating charge to produce an explosion of the first order. Fulminate of mercury appears to be requisite in all cases, but fulminate of mercury is even more sensitive to shock than either ordinary dynamite or dry gun-cotton; hence the resulting shock must be tempered so as not to explode the more *sensitive detonating* charge rather than the specially insensitive *bursting* charge. Wet gun-cotton has been substituted for powder charges, but being quite wet reduces its explosive ability very considerably. Particularly is this the case where no detonating charge is used of dry gun-cotton and fulminate of mercury, or where this detonating charge is relatively small. Where the explosion takes place by simple impact, not alone is it of a low order, but, as the initial point of explosion is from the front, the resulting injury to the target is less than from a blank shell.

It is, therefore, almost useless to throw high explosives in powder-gun shell, unless at the same time effective explosions of a high order can be assured. This was exemplified in some experiments made at the Naval Proving Ground by Commander Folger, U.S. Navy, and appears to be corroborated by such reports of French experiments and the "Resistance" experiments as were attainable.

Where very large charges are to be used, the electrical primer enables us not alone to have rear ignition, but also to have a number of centres of simultaneous ignition, should this be found necessary.

From experiments made by Commander Folger, he arrived at the following conclusions, in some respects similar to those above stated. These are as follows:—

(a.) Using a weak shell charged with the high explosives, no material injury would result to the over-water defence of a modern ironclad, even with gunpowder as the propulsive force, and using greatly increased bursting charges. The effects *nil* with low velocities, will be equally valueless with high velocities.

(b.) It is believed that, using a strong walled *steel* projectile, the explosion occurring at impact at an elevation of temperature of less than 300° F., the effects will be less notable than with similar projectiles charged with gunpowder.

This last conclusion has been fully confirmed by experiments at Sandy Hook and elsewhere.

The use of gunpowder and the hydrocarbons in combination with the compressed air has been suggested. Both of these have been tried at Fort Lafayette, but with unsatisfactory results. It is difficult to eliminate both the elements of shock and heat to such an extent as to ensure safety beyond question, as well as that uniformity of action required to give the great accuracy of fire which has been obtained with the compressed air alone. The only explosion in a gun which we have experienced at Fort Lafayette was due to an experiment tried in Mr. Mefford's behalf. Having proposed a combination of powder and compressed air propulsion, he was permitted to

try it, with his original 2-inch gun, out of consideration of the fact of his having been the pioneer in this field. As I could not be present at the experiment, I gave directions to my assistants not to permit anyone to be exposed during the trial. The gun was burst as I expected. Mr. Mefford afterwards tried the experiment with a very complete system of air and other cushioning, at Sandy Hook, but with the same results—the bursting of the gun.

In my experimental work, whenever any new method or arrangement suggested itself or was suggested by others, the first question considered was as to safety. If apparently safe, tentative experiments were tried, which as far as possible would represent the conditions in the gun when fired. Safety being assured, here the experiment was tried in the gun itself. Quite satisfied with the degree of danger involved, even by the use of compressed air, and having as yet by its use accomplished much more in projecting torpedoes than has been accomplished by others, I am quite content to let the matter rest at this point until others have actually accomplished more by using gunpowder or hydrocarbons, leaving them to bear the brunt of the danger in trying to accomplish it. It is usually a very long and devious road from the conception of an idea to materializing it into a practical form.

It will be evident from the preceding remarks that the pneumatic gun is chiefly considered with reference to its ability to destroy ships. For this purpose it can be used both ashore and afloat. In discussing its various uses it is necessary to make comparisons with weapons already in general use in order to have its peculiar advantages recognized. Superhuman certainty of action and omnipotence are not claimed for it. The physical conditions involved, however, ensure unusual chances of obtaining success. But the judgment, skill, and nerve of the human operator are as essential factors with this weapon as with all others. It is not intended to imply that these last do not still have important fields of action. But the pneumatic torpedo-gun will certainly powerfully supplement them, and in some places be substituted for them.

For Coast Defence.

On land, these machines may be considered as valuable adjuncts to any system of stationary and movable submarine mines operated from shore, as well as to a portion of the high-angle firing armament which will be so largely used in modern defences. Their functions here are manifold. Let us grant for a time, entire sufficiency within their striking radii of the fixed mines when first planted, and that they have remained intact up to the time of action. In a very large harbour it is impracticable, from considerations of expense and physical conditions, to effectually cover the entire area of every avenue of approach by a suitable number of stationary mines. The guns should, therefore, be so placed as to effectually cover by their fire the mine-fields and all zones otherwise unguarded. In the course of action some groups of the fixed mines will be exploded either by the enemy's

countermines or by the defence, when partial advances are made by the enemy. It will be impracticable to replace these exploded mines in the face of an active enemy. The pneumatic guns will be able to cover by their torpedoes the avenues of approach thus otherwise left open, and shower the path of advance with their missiles.

The range of the gun—4,500 yards—is sufficient to throw its torpedoes far beyond the distance at which the lines of fixed torpedo defences will usually be placed from the main works, which must be able to protect them, or, at least, be able to delay the enemy in cases where countermining is possible. This range is also much greater than that of the dirigible torpedoes which some authorities appear to consider necessary adjuncts to a system of permanent defences. The controllable mine-fields are thus practically extended far beyond the range covered by the ordinary fixed and movable submarine mines.

Let us now examine some of the limitations of fixed and movable submarine torpedoes. The operation of putting down controllable fixed mines is one requiring a large, highly trained personnel, great care, and skill. It cannot be done hurriedly. Those who have had experience in this work will realize how many links of the chain there are which must be absolutely perfect to have the system efficient. The conditions of weather must be favourable. Storms may delay for a long period the putting down of a system of mines, at times when the delay may be fatal. To put them down long in advance of hostilities involves great chances of deterioration and injury by storms and other causes before they are needed. Where the channels are very deep, ground mines are not to be thought of, unless made exceedingly large. If the current is very strong and the rise and fall of the tide is very great, buoyant mines are hardly practicable, as it is not possible to have them within effective striking distance at all stages of the tide. It is true that buoyant mines and circuit-closing buoys have been devised to adjust themselves automatically to varying heights of tide, but these are complicated and not reliable. Judgment firing is not likely to be accurate and reliable, owing to the very large swing and variable position of the torpedo, and the limited effective radii, particularly of such charges as are considered practicable in buoyant mines. If mechanical mines are used, the channel is hermetically sealed to friends, but may be removed by an enemy quite easily by countermining operations to be described hereafter, as may indeed all of the others.

A group or system may be rendered useless, by cables being injured or cut, as well as by injury to the entrances of the operating casemates. If the system be a complete one, commercial channels would be blocked to an intolerable extent. A complete system is therefore only permissible, where, in case of war, the closing of the port to traffic is of little consequence to a belligerent Power.

As to the dirigible torpedoes we have, at present, only the Patrick, the Sims-Edison, and the Brennan torpedoes to consider. The Patrick torpedo has a speed of 20 miles, weighs about 5,000 lbs., carries a charge of 300 lbs., and costs about 15,000 dollars. The Sims electrical torpedo has a speed of 11 miles, weighs about

4,500 lbs., and carries a charge of 300 lbs.; it costs about 7,500 dollars. Of the Brennan torpedo little of detail is generally known, except that it, like the Sims and Patrick, must be connected with the operating station by wires. In all of these a very large life artery is exposed to injury. The speeds now claimed are 20 miles for the Patrick, 18 for the Sims, and 27 knots for the Brennan.

Two, if not all, of these three are expensive, and all are bulky and relatively of no great speed. They must be seen the entire distance to be operated. This is a matter of no little difficulty at distances exceeding one-half a mile, where there is any mist, smoke, or rough sea. On coasts like that of Great Britain, where mists and fogs are not infrequent, this is a matter of grave importance, particularly where the operator is but a short distance above sea level. If they can be seen by the operator for the distance of maximum range (supposed to be 1 mile for the Patrick, $1\frac{1}{2}$ miles for the Brennan, and 2 miles for the Sims torpedo), the chances are fair that the vessel to be attacked will discover the approach in time to evade the blow. It should be noted that the greatest speed claimed for this last-mentioned torpedo is less than that of the most recently constructed ships of war, the Brennan alone exceeding it. It is within the range of possibility to stop or deflect them from their target. On the other hand, the projectiles of the pneumatic guns may be effective without making absolute hits. Neither booms nor netting can stop them. They are not affected by waves and strong and variable tidal currents. Their mean horizontal velocity for a range of 2 miles is about 300 knots, as against the maximum velocity of 27 knots recently claimed for the Brennan and very much less of the others mentioned. The attainable range is much greater. It can be used in conditions of mist and fog and rough water which would be impracticable with the dirigible torpedoes, as the hull of an enemy's ship would be visible at times when it would be utterly impossible to see the small unsubmerged portions of these machines. The operating chambers and launching ways for the Brennan must necessarily be at the water's edge, and their position would be surely known to the enemy. They would surely direct their fire so as to injure these, whilst they could anticipate with certainty the points from which they could be attacked. On the other hand, the sunken emplacements for the pneumatic torpedo-guns can be removed from the shores without anything to indicate their position directly to the enemy.

Only a single Sims-Edison or Brennan torpedo can be manipulated from each operating dynamo or engine, and the number of these must be multiplied accordingly. It is not beyond the mark to say that the Brennan torpedo could not be made to complete a full run, and have substituted for it another torpedo and made a run, in less than six minutes. Within that time if the target is moving only at 12 knots per hour, it is not likely that it will be within range for a second shot from the same station. The pneumatic gun can deliver its fire at the rate of one round per minute, and more frequently if required; and a single gun could fire about fifteen rounds whilst a vessel is within its range, under conditions similar to those reported to have

existed in the recent Isle of Wight experiments. The relative cost of each torpedo is very much less, being from one-thirtieth to one-sixtieth in the case of the Sims and Patrick torpedoes respectively. Without an exact knowledge of the cost of the Brennan, and without considering the amounts expended for the right to use it and its development, I venture to say that each torpedo costs at least twenty times as much as the aerial torpedo shell carrying the same weight of explosive.

The following remarks made recently by Lieutenant-Colonel Walford (h. p.), R.A., before this Institution, appear to be well suited in considering the relative value of the pneumatic gun for harbour defence, when compared to fixed mines.

II. The defence of guns is active; that of mines passive.

III. The destruction of mines is a matter of time; the silencing or destruction of guns requires something more.

IV. Guns are always ready; mines require careful preparation, and constant care and renewal.

From this it would appear that the pneumatic gun will, in all places, form a valuable supporting adjunct to the fixed mines, where these are feasible, entirely replacing them when injured or removed. In very deep channels or where the currents are swift and the rise and fall of the tide considerable, and the commercial use great, the pneumatic torpedo-guns should be substituted entirely for the fixed mines.

As examples of situations where the pneumatic torpedo-gun appears to be peculiarly suited for the torpedo defence of the Channel, we may cite the Mersey at Liverpool, and the Golden Gate at San Francisco, in the United States. At Liverpool we have, in the Mersey, a channel having a rise and fall of tide of from 23 to 33 feet. The current being strong, and the passage incessantly used for commerce, buoyant mines are inadmissible, even if the difference of depth at high and low tide did not affect unfavourably the striking distance of the torpedo, and rendered the position too uncertain for judgment firing. The distances to the channel from any position on shore where the operator could be placed are so great as to make it difficult to successfully operate the controllable fixed mines, and entirely out of question to operate therefrom successfully the Brennan torpedo. A few pneumatic torpedo-guns placed here could cover a large area of the channel, be always ready for action without blockading the channel, and require but a small personnel to operate them. At San Francisco the channel is so deep and current so swift that both fixed and buoyant mines are inadmissible. Three 15-inch pneumatic guns have already been ordered by the United States Government for this position as well as seven others for New York Harbour and Boston.

Besides their use as an adjunct to or as a substitute for torpedo defences, these guns may also be considered as a portion of the armament for high-angle fire, with the advantages of greater accuracy than the howitzer, and the chances of producing decisive results even when missing direct hits. They will be particularly useful in protecting the interior zones, whilst the high-angle powder-gun armament protects the outer zones.

It is frequently argued that the range of the pneumatic gun is too short to be used effectively against an attacking fleet armed with long-range powder guns. Against this we bring the argument of actual experience in the bombardment of Alexandria and elsewhere. Here the British Fleet practically exhausted its supply of heavy ammunition; although the ranges averaged less than 3,000 yards, the works were so little damaged that they would have been defensible by good troops.

At the Inchkeith experiments from H.M.S. "Sultan" of August, 1884, with a calm sea and firing with extreme deliberation at a gun mounted *en barbette* at ranges varying from 850 yards to 3,500 yards, the injury produced in firing thirty rounds from the 10-inch R.M.L. was that only four dummies representing cannoneers were hit, and the gun-carriage so slightly injured that the gun could still be worked.

Further experiments at Inchkeith with machine and rapid-firing guns at ranges within 2,000 yards, produced no very appreciable results.

At the experiments at Portland bill, November, 1885, from H.M.S. "Hercules," at a disappearing 10-inch B.L. gun dummy, the ranges being only 750 to 950 yards, firing 6,910 rounds from 1-inch and rifle-calibre guns, and 29 rounds from 6-pr. Hotchkiss, there were only 16 direct and 9 splinter hits, notwithstanding that the disappearing device had broken, so that the dummy was exposed for three minutes continuously out of the ten minutes during which the firing lasted.

Again, at ranges from 2,200 to 2,845 yards 15 rounds of 10-inch common shell and 13 rounds 10-inch shrapnel were fired without any results.

A fleet will not, in view of these experiences, waste its limited supply of bulky and expensive ammunition at long range. It will surely close to range well within the field of action of the pneumatic torpedo-guns, and these will then be able to do effective work for the defence.

As the objective target of the pneumatic torpedo-gun is the under-water hull, and ricochets are very irregular, it is desirable to use such angle of elevation as to ensure the shell not ricocheting. For this reason, direct fire is undesirable and high-angle fire must be resorted to. Ordinarily an angle of not less than 18° should be used, as at lower angles the shell may ricochet. As a consequence of this, deep sunken emplacements, now considered the best for all guns, when possible, are well suited to these guns. At 18° elevation, as the minimum angle of fire, the muzzle of the gun may be 8 feet below the crest of the glacis, when the gun is horizontal. The boilers, compressors, and storage reservoirs can be placed well under cover, some distance removed from the guns, if considered desirable.

These guns are well adapted to land siege operations, as they can be transported in sections of comparatively light weight, and put up in the trenches. With suitable delay action fuzes, the torpedo shell could do most effective work against earthen parapets, whilst they would be extremely demoralizing if exploding within a work. Even if filled with the large charges of gunpowder which these shells can contain, very effective work would be done. As there is no smoke and but little noise when operating the pneumatic gun, if placed behind hills or woods, it will be very difficult for the enemy to locate the battery. Air compressors, worked by horse-power, have been designed for use in siege operations.

Naval Uses.

With the question of accuracy on land established, the naval Officer, bearing in mind the difficulties he meets with at sea in firing powder guns accurately, doubts the ability to obtain accuracy afloat with the high-angle fire of the pneumatic gun. We shall therefore have to examine this from the naval point of view. The unknown range and unstable platform enter as factors of uncertainty. The flat trajectory of the powder gun does not require such accurate knowledge of the range as in the case of the high-angle fire of the pneumatic gun. To this I would answer that the latter has practically a larger target presented, both in having the large area of deck available, and in the considerable danger zone surrounding the ship.

As pertinent to this, the following remarks by Ensign Brainard, U.S. Navy, may be interesting in this connection:—

Of foreign cruisers that might possibly attack our ports, most of them—about 97 per cent.—are armoured. Their average speed is 14 knots, length 305 feet, breadth 62 feet, depth 25 feet, height 26 feet. Taking this as the average attacking ship, we have as a target for a high-powered, low trajectory rifle, counting chance of ricochet, an average parallelogram of 52 feet in height, and 257 feet in breadth; as a target for Whitehead or similar auto-mobile torpedo, we have a parallelogram of 25 feet by 257 feet; as a target for the pneumatic gun, we have, taking 15 feet as the effective explosion distance, a parallelogram of over 66 feet by 287 feet. The areas of the parallelograms are for powder rifle, 13,364 square feet; for submarine torpedo, 6,425 square feet; and for pneumatic gun, 18,942 square feet. The pneumatic gun has, therefore, the largest target. From the data at our disposal, the average error at 1,000 yards, in train, is 18·8 feet for the pneumatic gun. This compares well with the rifle guns in use, and especially well with the smooth-bore shell guns to be found in the Navy. No such accuracy is even hoped for in auto-mobile torpedoes. Average time of flight of projectile from powder gun, 1,000 yards, 3·2 seconds; of auto-mobile torpedo, 143 seconds; of shell from pneumatic gun, 6·25 seconds. Taking into account the various directions or courses our enemy may steer, he will have an average motion across the line of fire of 16·57 feet per second. He will, therefore, move 53 feet while the rifle projectile is making the range; 2,369·5 feet while the torpedo is making it; and 103·6 feet while the shell from the pneumatic gun is travelling the distance. The rifle has the advantage here, the pneumatic gun coming next, and the torpedoes are way astern.

* * * * *

Ensign Brainard has given too small a danger radius for the aerial torpedo shell. If 200 lbs. charges are considered, the effective danger radius will be not less than 25 feet. This will add about 7,000 square feet to the area of the target for it, thus giving about twice the area allotted to the powder gun. Any increase of the parallelogram for the powder gun projectile, due to chances of ricochet is hardly warranted in view of the very erratic and very high trajectories of the latter after striking the water and ricocheting. They would then hardly strike the target unless the original line of fire was very wide of the mark. He allows also for a chance at the under-water hull. This is hardly attainable in view of the very great ease with which shell ricochet which are fired at low angles.

Summarizing this, it appears that we may claim for the pneumatic torpedo-gun at least twice the size of target presented for the powder gun, and four times that for the submarine movable torpedo.

It is conceded that the flatter trajectory of the high-power powder gun gives it some very important advantages as to increased danger space when the platform is perfectly stable. But there are also some disadvantages when used on shipboard, for errors of angles of elevation

due to rolling of ship may produce very marked changes as to point of impact on the vertical target, which is almost alone attainable by its fire at short ranges; the errors of range as to the horizontal plane will also be considerable. An error of angle of fire of only fifteen minutes, of the high-power powder gun, will throw its shell, at a range of 1 mile, about 23 feet above the point aimed at. The change in range will be, with the 8" B.L. rifle, 230 yards. An error of angle of fire of 15 minutes with the 15" gun of the dynamite gun cruiser will produce a change of 15 yards.

Not being a naval man, I must again cite the testimony of a naval expert. Referring to the chances of accuracy of the guns of the "Vesuvius," Commander F. M. Barber, U.S. Navy, states as follows:—

"The rolling of the boat will affect the accuracy of the two outer guns more than that of the middle one, but there should be no great difficulty in firing the gun by hand or automatically at the middle of the roll if it is not excessive, and if it is excessive no other gun would do better.

"The pitching of the boat is a more serious matter, as we all know that our principal errors at sea are in elevation and not in train . . . it will be well to bear in mind that, although this boat is very sharp, it is not likely that she will ever be called upon to use her guns in any sea that would cause her to pitch excessively. According to M. Bertin, the proportion of the maximum of pitching to the maximum of rolling in most ships is only 1 to 5, and in the experiments with the 'Devastation,' 'Agincourt,' and 'Sultan,' it was found that for each *degree* of inclination, the bow of the 'Agincourt' would move vertically 4 feet, and the 'Sultan' 3 feet.

"The apparent angle was very great, but *actually* it was very small. In waves 400 feet to 650 feet long, and 20 feet to 26 feet high, the average pitch of the 'Devastation' was only 4°, and that of the 'Agincourt' was less. The length of the 'Devastation' is 285 feet, and the 'Agincourt' 400 feet. Now, the dynamite cruiser is 252 feet long, a very great length in proportion to that of any waves that she is likely to be used in, and her weights are not badly disposed. A change in the vertical height of the whole gun due to such waves would make but little difference in the trajectory, while with regard to the effect of the angular change, this gun has greatly the advantage over a gun with a flat trajectory. . . .

"A change of angle of elevation of 4° would vary the range only about 260 yards, or less than 2½ ships' lengths."

Probably the greatest difficulty which the naval gunner has to contend with is to ascertain the range of the target rapidly and continuously. To meet this difficulty, Lieutenant Bradley A. Fiske, U.S.N., has invented the electrical range-finder. Two instruments are placed on deck as far apart as practicable, and are continuously pointed at the target by two observers. No readings need be taken by the observers. The results are obtained by a third observer almost automatically and continuously at any part of the ship desired. In the case of the "Vesuvius," the range will be indicated on a dial in the gun-room, so that the valve settings may be continuously adjusted to the varying ranges. The gunner in the conning-tower will not, therefore, have to concern himself with the range, but will select the moment of operating the firing lever when the line is correct.

At a trial of Lieutenant Fiske's range-finder at night, with rather crude appliances and a very short base, results were obtained with an error of only 1.1 per cent., up to a distance of 2,600 yards. This degree of accuracy is sufficient for all

practical purposes, particularly in view of the size of a man-of-war. It is purposed to use another device by which the firing lever is kept automatically locked, except when the vessel is within any desired limit from its normal keel position as to pitch or roll. The gunner pulling the firing lever when the line appears to be correct will be prevented from moving until the angle is approximately correct. It is true that this may limit the number of fires available in a given time, but it is much better to fire less frequently, but with increased chances of attaining results. Should an automatic device fail to act, it is thought that the locking device might be operated by a gunner who will give his sole attention to the status of the ship with reference to its angle. In short it is proposed to give the gunner as little to think of as possible beyond pulling the firing lever, when the gun is directed on the target.

As to the alleged slowness of flight of the shell and the probable displacement of the target during the time of flight, considering it as a torpedo, it might not be amiss to further compare its velocity with the best auto-mobile submarine torpedoes, at present assumed to be the Whitehead. Granting to these last, for a range of 300 yards, a mean speed of 25 knots per hour, this would imply a velocity of about 42 feet per second. The mean horizontal velocity of a shell from the pneumatic gun at a range of 1 mile is about 580 feet, or about fourteen times as great as that of the movable submarine torpedoes. This certainly is not an unfavourable showing as to relative speed. The enemy's ship, therefore, will not have moved as far during the time of flight through a distance of 1 mile of the torpedo from the pneumatic gun as during the passage of the submarine torpedo through a distance of only 300 yards. Again, the latter must make an absolute hit, while the former may be effective even when having missed the target by a good many feet. Of course a skilful gunner will make allowance for the probable movement of the target during the time of flight, and accuracy of judgment in this case need not be so great as in the case of the submarine torpedo. Assuming that an enemy's ship 300 feet in length is moving at a speed of about 12 knots, it will have moved little more than one-half of its own length during the time of flight of the shell for a range of 1 mile; if the ordinary movable submarine torpedo is discharged at its effective range of only 300 yards the vessel will have moved more than once and one-half times its own length, or nearly three times as far. At greater speed of the target than 12 knots the disparity of distance will be even greater. Even conceding 33 knots as the speed of the Whitehead, the disparity is still very great.

When the pneumatic gun is brought to closer quarters than 1 mile, the chances in favour of its torpedo are relatively greater.

It is said that in the use of movable torpedoes exact knowledge of the range is not required. But unless used against a stationary target this is not the case; owing to its relatively slow speed, a close approximation of the enemy's range as well as speed of movement must be made, to make due allowance for the probable displacement of the target during the passage of the torpedo. If delivering fire against the broadside of a ship the submarine torpedo has as its margin one-half the length of the ship as to its direction, but with the chances of the results of errors of judgment being increased by its long time of flight. The torpedo shell has the same margin as to its *line* of fire, increased,

however, by some yards ahead and astern of the target and the very much shorter time of flight. In addition to this, the latter has, for this case, a margin for error of range of certainly twice the width of the ship, the margin being greater in both directions where larger charges are thrown.

If the fire is delivered ahead, the submarine torpedo has a margin of only one-half the width of the ship well *below the water-line*, where the breadth is less. The torpedo shell has practically a margin of the width of the ship as to its line of fire, owing to the danger zone when missing the direct hit. It has also a margin as to error of range of something more than the length of the ship. Besides this, a vessel carrying the pneumatic torpedo-gun can deliver fire directly ahead *whilst moving at full speed*. The torpedo-boat using the submarine torpedo *must either turn and expose its broadside, or slow up very considerably* before attempting to deliver its fire straight ahead, if it is to avoid danger of running into its own torpedo. I will continue the comparison of the torpedo shell of the pneumatic gun system with auto-mobile submarine torpedoes. The Whitehead torpedo, whilst having a possible range of 1,000 yards, can hardly be said to be very accurate even at 300 yards. Particularly is this the case when discharged from a vessel in motion, and very great fault has recently been found with this. It is subject in its flight to varying and unseen eddies, currents, and waves. It must make an absolute hit to produce results. It may be stopped by booms or netting. It carries so small a charge that even if in contact with the enemy's hull, doubts are expressed of its efficiency. It is relatively bulky and expensive, particularly the most recent large type. Very few can well be carried, and each time one is used a considerable proportion of this portion of the armament is thrown away.

Torpedo-boats.

The gun can be used advantageously on board of torpedo-boats in lieu of ordinary movable torpedoes or in conjunction therewith; some of the advantages, compared with the latter, have already been stated. To get in the shot at all effectively, if equipped only with the ordinary torpedo, they must approach so near that discovery is almost inevitable, and the chances of escaping the firing of machine and rapid firing guns are comparatively slight. The dangers to the torpedo-boat may well be deemed to be inversely as the square of the distance, and a boat which approaches to say 352 yards (one-fifth of a mile), will have one twenty-fifth of the chance to escape the enemy's fire, and to get in its own fire, possessed by a torpedo-boat carrying pneumatic guns capable of firing their aerial torpedo a distance of one mile.

The objection is raised that the long tube of the pneumatic gun will be difficult to manipulate accurately and quickly whilst in motion. Recent experiments have enabled us to produce the same results with much shorter barrels, more easily manipulated on ship-board. The "Vesuvius" guns have been shortened from a length

of 70 feet down to 55 feet. A 15-inch gun for land service has been built, which is only 32 calibres in length, whilst powder guns are made frequently 35 calibres in length, and will be made even longer.

Besides this, the peculiar character of the valve arrangement make it unnecessary to constantly change the elevation, although it is purposed to make this adjustable when required.

It is urged that the thin gun barrels will be easily injured by the enemy's fire of machine and rapid firing guns, that there is very great danger of exploding the shell whilst still in the muzzle. Torpedo-boats for the Whitehead torpedoes have over-water discharge tubes. These are even more liable to injury from the same kind of fire, and the torpedoes may be exploded before being ejected, as they must approach nearer to the enemy. It is difficult indeed to carry on operations of war without some danger to the combatants. The striking, by the enemy's fire, of the very much exposed over-water discharge tube of the Whitehead torpedo, before it is brought in action, will be quite as disastrous as the explosion of the aerial torpedo shell, at the instant that it is leaving the muzzle. The pneumatic torpedo tube may be so placed as to bring the greater part of its length below the deck. The breech section containing the shell is below the water line, and can be further protected by coal and armouring, such as protective decks, &c. Should it be considered desirable to use the gun at lower elevations, more protection might be afforded in heavier plating of the decks and semi-casemate or hood directly over the guns. The muzzle part which projects above the decks can be made very thick, and may be protected by movable hoods or shields. Thus, very fair protection can be given both to the tube and to the torpedo, except at the instant of firing. Recent experiments with rapid firing guns against heavy powder guns as high as 9.2' in calibre, show that even these may be seriously injured, and rendered *hors de combat* by this species of missiles.

Although greater weight will be demanded for the pneumatic torpedo-gun than for the ordinary torpedo appliances, it is thought that the advantages of greater attainable range, greater charges thrown, and more accuracy, will compensate for this disadvantage. The small weight and bulk of the torpedo shell aid to balance the greater weight of the gun, &c. A larger number of torpedo shell can be carried. A revolver boat gun of 8-inch calibre has recently been designed, weighing with complete equipment not more than 8 tons. This is capable of firing eight shells in about two minutes. One of 10-inch calibre will weigh about 10 tons.

The loss of speed, due to carrying heavier weights, is compensated for the longer range of effective action than with the ordinary torpedo. But if we consider the combined speed of the vessel and its torpedo, a very wide margin is left for the pneumatic torpedo-gun vessel.

U.S. Dynamite Gun Cruiser "Vesuvius."

This vessel is equipped with three 15-inch guns, placed at a fixed angle of 18°, all parallel with the keel and abreast of each other,

pointing forward. The guns are directed by steering the vessel, the range being varied by changing the setting of the valve, which changes the "cut off," the pressure remaining the same. The vessel having twin screws, it has been found that the direction can be given very readily. Three calibres of shell will be used, 8" and 10" sub-calibres and 15" full calibres. The ranges will be 2 miles, $1\frac{1}{2}$ miles, and 1,500 yards respectively. The rate of fire will be once per minute from each gun, and thus one shell can be thrown every twenty seconds. Thirty-three rounds can be so carried as to maintain the maximum rate of firing until these are expended. We can hardly imagine a condition of things where a larger number would be required, before decisive results are obtained one way or the other.

Comparison of the "Vesuvius" with the "Ilgin," "Tripoli," "Destructor," "Sharpshooter," "Rattlesnake," and "Bombe" show that she can launch more than three times as much explosive as is carried by the largest of these, to more than five times the effective range if we consider the largest charges, and this in about one-half time required, where seven torpedo tubes are to be used. If the comparison is extended to shell carrying the 200 lb. charges, the "Vesuvius" guns still maintain superiority of the amount of explosives thrown, and the range becomes close upon ten times as great as that attainable by the locomotive torpedoes. If comparison is made of a pneumatic torpedo-gun as mounted on the "Vesuvius" with a single torpedo tube, the rate of fire is as eighteen to one. With new designs for torpedo-boat guns, the rate will be five per minute or thirty times as rapid as that attainable by the Whitehead torpedo tube.

It hardly seems worth while to continue the comparison farther, as it must be obvious that the pneumatic torpedo-gun, as mounted in the "Vesuvius," can throw more explosive to far longer ranges, and with much greater rapidity than is possible with any other system now in existence.

The "Vesuvius," having a speed of more than 20 knots (she has attained 21.65 knots at the official trial), cannot but be a formidable vessel, with her armament. It is flippantly said that she will be easily and surely destroyed by the rapid gun fire; but this is not so obvious, as she need not necessarily choose broad daylight or perfectly clear weather to make her attack. She has the same choice of times and place to make her attacks as are open to the ordinary torpedo-boats, and being able to operate at so much longer ranges has a very much greater chance to produce results before she is destroyed.

Torpedo Rams.

It is perfectly possible to construct vessels of moderate size, of very low freeboard, of fair speed, quite heavily armoured, and of such form as to defy the rapid gun fire, and approach the most powerful war-ship afloat, with more than fair chances of sinking her, if equipped with large calibre pneumatic torpedo-guns. In fact, something approaching this description, called the harbour-defence vessel, is now building for the United States at San Francisco. This vessel

will carry, besides other armament, a 15" revolver pneumatic torpedo-gun in the bow, capable of throwing five shells, each carrying 500 lbs. of explosive gelatine, in one minute.

A vessel such as the "Polyphemus," if equipped with one or more pneumatic torpedo-guns, would become very much more formidable than when equipped only with an armament which implies an approach to the enemy within 300 yards or to actual contact.

Use as an Adjunct to Ship's Ramming.

It is held by many naval Officers that ships will use the ram in the course of naval combats. Granting this, a modification of the pneumatic torpedo-gun of 15" or 20" calibre, throwing charges of from 500 to 1,000 lbs. of explosive gelatine, can be introduced into a ship, of such form as to be but very little in the way. In case of ramming being undertaken, it would serve as a most valuable adjunct, and might be said to be equivalent to extending the length of the ram from 800 to 1,000 yards. The chances of pointing the ship fairly at the enemy's broadside, at this range, are much better than of coming to an absolute contact.

This could be done by placing in the bow of the ship a tube about 30 feet in length and say from 15 to 20 inches in diameter. The gun may be placed parallel to the keel, and at a permanent angle of elevation of say 20°. The tube may be fixed, the muzzle coming out at the bow somewhat above the water. The muzzle should, of course, be protected by a suitable movable shield. The body of the gun, especially that part in which the charge is placed, the breech, being well below the water-line, is sufficiently protected. The bow ordinarily is very little subject to being hit. A 20-inch shell could contain about 1,000 lbs. of gelatine equivalent to 1,420 lbs. of dynamite; with a pressure not exceeding 500 lbs. it could be sent at least 800 yards in advance of the ship, it being assumed that she is steering directly upon the enemy.

Should there be a direct hit of the enemy's hull above water, there can be no doubt that the detonation of this enormous mass of explosive would be extremely injurious; exploded below the water-line it would certainly be fatal. The additional weight demanded by adding such a tube to the armament would be small compared to the results attainable. The gun may be arranged as a revolver, so that five rounds may be fired within one minute.

I consider this one of the most important uses of the gun—being readily applicable to vessels now in service. Even if it were only possible to place a barrel 20 feet in length, excellent results would be obtained.

Countermining.

Besides the direct aggressive action against an enemy's ship, I would call special attention to the great utility of the gun for countermining. In no other way can this be done so thoroughly and readily, with the minimum danger to the besiegers. Operations may be commenced 2 miles from the nearest point at which the mines are likely to be placed, and continued with relative rapidity. Not alone will the aerial torpedoes be effective against the ground and floating mines

operated from shore stations, but the operating cables are likely to be cut, and entire groups rendered innocuous. Besides this, all mechanical mines will be destroyed within a very large radius of the countermining explosion. Shell with smaller charges can be used for this purpose.

A vessel carrying three 15" guns has been designed especially for this work. It is to be of 3,300 tons displacement on a draught of 18 feet—to be turtle-backed, protected by 5 inches of steel armour, and to have its under-water hull made especially strong, being well protected from the action of torpedoes by numerous compartments and cellular subdivisions, these latter being filled with cellulose if found desirable. The vessel is designed of this size, both for purposes of protection and to enable her to carry an ample coal supply, and a very large supply of ammunition. The shell to be used will be 8-inch sub-calibre carrying 100 lb. charges. It is contemplated carrying about 1,200, which will suffice for countermining a channel 7 miles in length and 100 yards in width. Besides the explosive torpedoes, there will also be some buoy shell arranged somewhat like the explosive shell, but having no charge. Upon striking the water, the head is made to detach, and going to the bottom, enables the body to float and serve as a buoy, being attached to the latter by a wire rope. This buoy can be made to serve as a light, on striking the water, so that the countermined channel can be advanced over at night, if desirable.

Three guns are to be mounted forward, and abreast of each other as in the "Vesuvius;" but the middle gun, however, is to be fixed in direction, but may be elevated, whilst the two outer ones will have a slight lateral train. The mode of operation will then be something as follows:—The vessel being brought to anchor (preferably at night), at the outermost position at which it is deemed advisable, the guns being at the same elevation and the valve setting the same, the outer guns are placed at such an angle, as to direction with the middle gun, as to land the shell 100 feet on either side of the shell from the latter, at the extreme range determined upon—this may be 2 miles or even more, if necessary. The guns and valves are then set so as to throw the next set 100 feet *nearer* to the countermining ship. When at least ten sets of these have been thrown, a buoy shell may be fired from the middle gun to attain the same range as the set first thrown. By commencing at the longest range, and working backwards towards the countermining ship, the greatest economy of the compressed air is obtained and the largest number of rounds can be fired continuously. The vessel can be maintained in the desired direction either by anchors, on either side, and suitable warping arrangements or by side hydraulic jets.

Not alone will the countermining shell act directly in breaking up and exploding the fixed mines and cables, but the upward lift of the great wave formed by the simultaneous explosion of the three shells will be likely to tear the buoyant mines and circuit-closing buoys away from their moorings.

The countermining can be easily done at the rate of 1 mile in two hours, and even more rapidly if desired. It is true, as it will be said, that the besieged will not permit this operation to go on unmolested, but that may be said of any other method of countermining attempts. The countermining vessel must be guarded from the attacks of the enemy's torpedo-boats and possible attacks by dirigible torpedoes, trusting to the character of her armouring as protection from an occasional hit by the enemy's guns. No operation of war is likely to be entirely one-sided, and it is only possible to so arrange them that the *chances* of success are of the best. Is there any known method of countermining which is more rapid, certain, and feasible than the one now proposed?

A vessel armed as this is, will, as pointed out by Commander F. M. Barber, United States Navy, be most valuable for high-angle fire essential for the successful attack of modern sunken emplacements. Regarding this, Commander Caspar Goodrich, United States Navy, in a report on the bombardment of Alexandria, states the following conclusion:—

"If Admiral Seymour had possessed a vessel carrying both heavy, modern, high-powered guns and large howitzers, or other shell guns capable of great elevation, and thus somewhat similar to the mortar in application, she would have been of immense value, for she could have run close into the forts. With the shell and machine guns she could have driven the Egyptians away from their batteries, dismounting the latter with comparative ease at short range with her powerful ordnance. Valuable as Gatlings and Nordenfelts may be, under certain circumstances, it cannot be denied that they lack the moral effect of well-burst shell. Something approaching vertical fire must be secured for operations of this nature. . . . The necessity of a thorough determination of the possibilities of vertical fire must be patent to the most careless reader of this report. It is hardly an exaggeration to suggest that of all the directions open to the development of ordnance at the present time, this is by far the most promising and important. The writer feels strongly, not to say imperative obligation of working out this problem under the new conditions of the moment, and unhesitatingly recommends it as worthy of serious consideration and practical investigation."

Light Buoys.

Should the light buoy shell be made to operate successfully, they will be of use for the defence both of shore batteries and ships at anchor, having many advantages over the electric search lights. These last indicate the position from which they are used, and not infrequently aid the attack without assisting at all the defence. In the case of a ship at anchor, she might surround herself by a cordon of these light buoys, say at the distance of one mile, with some on an interior line. The defenders will be more likely to perceive the approach of an enemy's torpedo-boat by means of the diffused light over a large space, than by the blinding concentrated ray, reaching only a single narrow sector or zone, making more intense the surrounding darkness. Not alone will these light buoys serve to make visible the approach of the enemy, but will also give, from their relative positions, and the accuracy with which the pneumatic shell can be projected, a close approximation to the range. Similarly, from shore defences these light buoys may be thrown, and serve to illuminate the approaches. These buoys when fired from the 15" gun, can be made to burn about two hours. A very large light ball shell can be used with effective lighting possibilities from the pneumatic gun.

Use for Defence of Ships against Torpedo-boats.—Dirigible Torpedoes and Submarine Boats.

The present *active* defence of a man-of-war against torpedo-boats is dependent on absolutely hitting a *small* and rapidly moving object. This is somewhat difficult of attainment. With the shell from the pneumatic gun an absolute hit is not required. The hulls of torpedo-boats are so slight that a pressure of say 1,000 lbs. per square inch would be enough to disable them, if not to absolutely disrupt them.

A shell with 100 lbs. will effectively *stop* the approach of the enemy's torpedo-boats before they can discharge their Whitehead torpedoes, even when the explosion takes place at a distance of more than 50 feet from the boat, if General Abbot's formulæ are correct.

Again, should the enemy's torpedo-boats succeed in discharging their under-water movable torpedoes (such as the Whitehead) the present armament of a man-of-war is incapable of stopping them in the least, unless the wire protective nettings are down, and even this may not always suffice. These nettings, however, are not always down, and cannot be put down if the vessel is meant to retain her full manœuvring power. The prompt use of a small rapid firing pneumatic gun might afford a chance in this direction, as its shell would burst under water, and have a large effective radius, in a field where the ordinary powder gun projectiles cannot be effective. There is also a chance of stopping dirigible torpedoes such as the "Patrick," "Sims," and "Brennan," by this means. Besides the possibility of injury to the hulls of these torpedoes and the delicate machinery contained, all of these may be rendered innocuous by injury to the long wire on which they are dependent for manipulation and life, and the shell would be effective in exploding either directly ahead, abreast of, or a very considerable distance in rear, in the line of movement of the torpedo.

A pneumatic torpedo-gun of comparatively small calibre as dirigible as the rapid firing Hotchkiss is being designed for this purpose.

Submarine boats will doubtless be important factors in future naval operations and combats. Their presence and approach may sometimes be detected by bubbles and other indications. In the experiments already made with the Nordenfelt submarine boat, although it was so far submerged that no part of the ordinary armament of a man-of-war could have stopped it in its approach and attack, its presence was detected; it could easily have taken up a position within 300 yards, at which distance it could discharge its Whitehead torpedoes with some approach to accuracy. But a vessel armed with pneumatic torpedo-guns could send its shell into the water over or in the vicinity of the attacking submarine boat. The explosion, being regulated to take place when the shell was completely submerged, would inevitably end the career of this submarine boat.

A distinguished naval Officer has said, on the floor of this Institution, that the pneumatic torpedo-gun is purely a defensive weapon, and that Great Britain needed none such. This does not appear to be concurred in by the nation at large, if one may judge from the public discussions, the efforts, and expenditure made in erection of defensive works along the extensive sea coast of Great Britain. Neither is it borne out by the results of the naval manœuvres of the last two years, if these last have been reported correctly.

Whilst audacity is of value in warlike operations, it is well to assume that the enemy may be equally audacious and equally able. A nation's defence must not be based on prejudices or preconceived ideas, nor is it wise to underrate the strength, courage, and ability of all possible opponents. What a British Commander has been able to do (I refer to Admiral Tryon in last year's manœuvres)

may sometimes be accomplished by others. No naval force, however large, is in itself sufficient to ward off the attacks of an enemy having an efficient enterprising naval force, from all of the important seaports. These must be so fortified that the *time* is given for the arrival of naval succour. It is almost an axiom that every fort may be taken, and the chief value lies in that the attacking party is delayed by them, and time is gained for the concentration of the resources of the defence. With the sea-coast well defended on land, aggressive action on the part of the naval forces becomes more feasible.

Assuming for a moment that the *rôle* of a nation, in case of war, is to act purely on the offensive by its naval forces, the pneumatic torpedo-gun affords the best facilities for the countermining operations which the attack must resort to.

Let us imagine that the enemy's naval force will stand to fight, and, while equally well armed as to guns and ordinary torpedoes, his ships have a few pneumatic torpedo-tubes. Might not some of these chance to launch their aerial torpedoes effectively, and put to nought the armament, skill, and audacity of your own forces? We might even reasonably imagine that one of your leviathans might be attacked and *sunk* by a much smaller and less expensive armoured vessel of suitable design, having equal or greater speed and manœuvring ability, armed with rapid-firing pneumatic torpedo-guns.

Although it is frequently said, even now, that the pneumatic torpedo-gun is in an experimental state, may that not be said of every weapon that is in present use? Who will be so rash as to say that any of these have attained the ultimate of their development and possibilities?

But whether in an experimental state or not, it has successfully thrown with accuracy, and to distances unattainable by other torpedoes, very large charges, and it is capable of sinking therewith the most powerful and best protected war vessel afloat.

The CHAIRMAN: Gentlemen, I am afraid this is a subject which we are not very competent to discuss, but it is just possible there may be gentlemen present who would like to ask the lecturer some questions, and he has already told us how happy he will be to give every information to any present who desire to have detailed answers upon any special points that interest them.

Admiral COLOMB: I really do not know enough about the subject to ask questions, but I imagine that just towards the close of his lecture Captain Zalinski has referred to some expressions of mine made in this theatre, and I may perhaps be allowed to clear up that one point. He says that it has been stated on the floor of this Institution that the pneumatic torpedo-gun is "purely a defensive weapon, and that Great Britain needed none such." What I meant was that as it was then presented to us, it was in the same category precisely as the Brennan torpedo. I should just like to ask the lecturer whether any experiments have been made at sea, and whether the accuracy which seems undoubtedly to be got from a fixed platform can be got from a floating platform, because, of course, if that is the case, the weapon ceases to range itself beside the Brennan torpedo, and takes the character of a general weapon, which may go to lengths that I do not think any of us can predict. I regret that not knowing more I cannot ask more questions, but that really is the only question that has struck me, whether practice has been made at sea, and what proof you have of accurate practice in a sea-way.

Captain ZALINSKI: Unfortunately we have had no practice in that direction, but

I have given in the course of my paper the reasons why I expect more than ordinary accuracy. Of course the fact that the same degree of accuracy is not attainable with either ordinary powder guns or torpedoes afloat as ashore is owing to the firing from an unstable platform. When the range is found by range-finders, the chance of obtaining results with the pneumatic gun is very much better than I think is possible for torpedoes in ordinary practice, or even by ordinary guns. I hope before long that we shall have experimented further in that direction, but it seems to me that the physical conditions involved are such that the chances of accuracy of fire are more than fairly good.

Admiral BOYS: My Lord, perhaps the lecturer would be kind enough to tell us if a practical trial has been made with training gear fitted to this weapon afloat. The length of the "Vesuvius" is stated to be about 230 feet. Now most naval men would agree that it is very difficult indeed to point a ship by a rudder when that ship is 230 feet long. When in former days experiments were tried with guns fixed in vessels to train by steering in a much shorter ship than that, the conclusion arrived at was that 90 feet length was almost the limit of management for pointing by the rudder. Perhaps I may take this opportunity of making a remark about the observation made by our noble Chairman respecting the Council of this Institution not having put off to-day's meeting. I may explain that the fact is that our days have been so very much engaged that there was really no other day on which we could conveniently have had this lecture, that is the reason it was fixed upon.

Captain ZALINSKI: It is perfectly possible to arrange the gun so that it can be trained. In fact, vessels have been designed to allow guns to be trained in them, but it was thought good results would be obtained in this way; in fact, we have experimented with the "Vesuvius" when the weather was comparatively rough, and having selected as a target the mast of a vessel, steering directly for her, so steadily that I should have deemed myself criminal if I had not hit a first-class man-of-war twice out of three times, at a range of one mile.

Captain JACKSON: Has the range-finder been tried, and is the base found sufficient for that gun? Have you got satisfactory results with it?

Captain ZALINSKI: That also has not been tried afloat, but it has been tried under conditions as nearly analogous as possible. The base-line of 26½ feet has been found to give accuracy within 1 per cent. at ranges up to 2,600 yards. I have indicated that these ranges are obtained almost instantaneously. The first range may cause a delay of five or six seconds, but after the range is once obtained, the indication is almost continuous.

Lieut.-Col. WALFORD, h.p. R.A.: I may perhaps be allowed to ask one or two questions. I wish particularly to know, with regard to the shape of this shell, how the forward position of the centre of gravity affects the drift? In an ordinary gun the shot drifts to the right; perhaps the lecturer will kindly tell us what is the case in the pneumatic gun? I should wish also to ask how the shape of the shell affects its movements in wind, particularly in cross winds? The centre of gravity is so far forward that a large space is given for the wind to act upon in rear of it, and I should be glad to hear whether, owing to this fact, the shell tends to turn up into the wind, or to turn away? Then another point is the question as to how long the pressure can be kept up? Of course, as each charge is let off, there is a certain amount of pressure withdrawn from the cylinder which must be replaced, or there will be a tendency to fall off from the original velocity. This point has, I think, been hinted at by the lecturer since, when, in clearing a channel through a mine-field, he proposes to begin with the longest distance. I further wish to ask what is the muzzle velocity of the shell? As far as I can work it out, I take it to be 600 foot-seconds. Assuming that to be correct, I should like to ask whether any experiments have, to the lecturer's knowledge, been made with powder-charges throwing high explosives at so low a velocity? My impression is we have always tried to give a much higher velocity. The lecturer has told us something about the trial against armour, and has mentioned that the plates used were laminated, consisting of six small plates of a total thickness of 4½ inches. I think most of us who have worked at armour will say that it is scarcely a test, as the plates were of so small a thickness, while the metal cannot have been of very good character, since a 30 lb. shell with, I assume, a muzzle velocity of 600 foot-seconds, could

make an impression $2\frac{1}{2}$ inches deep in it. As a matter of fact, very little is known of the effect of high explosives against armour, but I must confess myself that what the lecturer has told us does not convince me that the gun would be useful against the upper works of an armoured ship. I thoroughly believe in it as a torpedo working under the sea, but not as against thick armour. There is one other question which I may perhaps ask. A table of effects of high explosives against armour plates is given in the paper, together with a formula, $W = 3.3d$; I cannot make these agree at all; d^2 seems to work out fairly well, but it does not appear from this table that the penetration can be in proportion to the weight, as it would be if the formula were correct?

Captain ZALINSKI: I do not know that I have all the points noted down consecutively, but I will take them as I happened to get them. As to the armour experiment, it was not for a moment intended to indicate what the explosive could do; the experiment was simply to try and show the *relative* effect of a shell charged with sand, a shell fired with an explosive by impact, and one exploded from the rear. It was not claimed that a laminated plate would be as good as a solid plate. As to the effect against armour, I tried to indicate that the gun was not intended for armour piercing or for direct attack upon the over water hull, but that there are possibilities of doing this very considerable damage. The formula referred to has been one that is considered simply as an approximation, the only thing attainable. It should read $W = 3.3d^2$. I do not know that I made it clear, but it was for explosive gelatine, taking the strength at 142 as against 100 of dynamite, and from that, I think, if you apply the formula, you will find the figures I give are approximately correct. I do not at all swear by that formula, but it is the only thing applicable. I should very much like to try the gun with heavy charges against armour, and produce better formulæ. I hope that may be possible when the gun is brought to Shoeburyness. I tried to get armour furnished for that purpose, but the Government did not seem inclined to expend money at that time. As to the velocities, the velocity of the 500lb. shell is about 600, between that and 650; whereas that of the 8-inch sub-calibre will be something over 1,000. As to the drift, it seemed to me that, so far as I have gone, if anything it is a reversed version of what is expected of an ordinary rifle projectile. When expected to go to the right, it seems to move to the left, but not very much. As to the effect of wind, we rather expected the deflection might naturally work into the wind, the centre of gravity being so far forward; but, on the contrary, it seems to have a very regular lee-way, as it were carried off by the wind, and so regularly that I can allow for it absolutely upon the first fire. The shooting has been accurate even under unfavourable conditions of wind. I use a method of my own in making allowance for wind, resolving it into its rectangular components with reference to the line of fire. I find the deflection produced per given range for 1 mile of wind at right angles to the line of fire, and, applying that, I can get my sight very nearly covered for the first time. The deviation due to the wind is not what might be expected, and it is so regular that accurate shooting can be done under rather unfavourable conditions as to wind.

Major-General W. H. GOODENOUGH: I think you told me you had applied a system of resolving the force of the wind into its rectangular components for rifle fire and found it very readily understood and taken up.

Captain ZALINSKI: Yes, we found that.

Major-General GOODENOUGH: I thought it might be interesting that this should be known.

Captain ZALINSKI: We have found that to be the case and it is now embodied in the "Target Record Book" and "Rifle Manual" issued for the Service. In a recent order from Headquarters of the Army upon the subject of artillery instruction, you will see that the instruction as to estimating the velocity of the wind and to resolving it into its rectangular components with reference to the line of fire is embodied as part of the instruction of the artillery of the United States Army. It no longer need be a matter of guesswork in adjusting the sight for wind deflection. There is no need of feeling your way and trying two or three shots, which is sometimes expensive and leads to loss of time. By applying it you can get a perfect line on the first shot.

Major-General GOODENOUGH : That might be particularly applicable in high-angle long-range fire.

Captain ZALINSKI : I should think it might, but I have not tested it sufficiently, because under some conditions the higher strata of air might have different velocities ; although in my experiments I got that by flying a kite having little toy balloons attached to different parts of the string. In this way I could judge of the direction of the higher strata. But the experiments were not carried to a definite conclusion.

The CHAIRMAN : Well, gentlemen, as no one else seems anxious to ask any more questions or to continue the discussion, I think we may bring our proceedings here to-day to a conclusion. The subject is, of course, entirely a novel one to all of us, and it is therefore very natural there should not be any one here, or perhaps even in England, capable of asking either intelligent questions or continuing an intelligent discussion upon this most interesting subject. I can assure the lecturer we shall all look forward with the most intense interest to those experiments which are about to be carried on at Shoeburyness with this gun. I think every one who takes an interest in gunnery, and I may say in both the Army and the Navy, has read with intense interest the reports which we have received from America of experiments carried out under the lecturer's care and guidance. I have read those reports with the greatest possible attention, and it has struck me on reading them, as I said in my opening remarks, that the development of this new implement of war is very likely to create a new departure in warfare both on sea and on land. I look forward, therefore, with very great interest to the experiments at Shoeburyness, and I hope if those experiments are successful—and I have every reason to believe that they must be, judging from the narrative of what has taken place on the other side the Atlantic—that we may not be backward in providing ourselves with a certain number of these guns for our own use in both the naval and military services. It now only remains for me to thank the lecturer for his great kindness in coming here and for giving us this very interesting lecture. I beg to assure him as I did before of my extreme regret that we have not had a larger audience. I hope he will understand that that fact is entirely attributable to the attractions of this week, owing to the great number of people and the large show of troops in the streets assembled to greet the great foreign potentate who has done us the honour of paying us a visit. Had it been otherwise, I am sure this lecture hall would have been as crowded as it has been upon previous occasions when Officers of other armies have visited us. I would beg to assure him in your name how very grateful we are to him for having come here ; and we hope it may not be the last time that we shall be honoured by the presence of an Officer of the United States Army lecturing in this hall.

OCCASIONAL PAPERS.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

THE PHOTOGRAPHING OF ARTILLERY PROJECTILES TRAVELLING THROUGH THE AIR AT A HIGH VELOCITY.

Translated from the *Deutsche Heeres-Zeitung* by Commander H. GARBETT, R.N.

IN September last year some very interesting experiments were carried out at the range of the Gruson iron factories at Buckau Magdeburg by Herr Ottomar Anschütz, the well-known expert in instantaneous photography of Lissa (Posen), which proved by some successful impressions the possibility of photographing projectiles from artillery during their flight at high velocities. It is the first time within our knowledge that this problem has been attempted at all and at the same time solved.

Herr Anschütz by these experiments only wished to demonstrate that it is generally possible during the flight of a projectile to fix its image by daylight sharply upon a photographic plate, and this not only once but in several consecutive phases, the number of which has been temporarily fixed at four. As these experiments were carried out at his own cost, Herr Anschütz found it necessary on account of the expense to limit in many respects the various ways of applying his method.

In taking impressions of bodies which are moving with great velocity there are two difficulties to be overcome; the first, so to shorten the time of exposure that the object appears sharply defined; the second, to obtain the impression at the exact moment when the object arrives at a given point.

With regard to the first-named difficulty, it is easily understood that, with increasing velocity in a moving body, it is necessary to shorten the time of exposure, as, if too long, instead of a clear sharply-defined picture, one crooked and elongated in the direction of its line of motion would only be obtained. In taking an impression of a projectile in flight, it is also to be feared that one would find upon the plate not a picture of the projectile but one of its calibre. Herr Anschütz believes that for a velocity of about 400 metres a second, the time of exposure must be limited to the extraordinarily short space of the 76 millionth part (0.000076) of a second; the projectile would in that time travel about 3 centimetres, and he therefore hoped that if he could fix his apparatus at a proper distance, and consequently diminish the visual angle, the projectile would appear upon the plate suffi-

ciently sharply defined, or at most a little misty about the edges at the front and base.

In order to give the reader an approximate notion of what opening and shutting a photographic apparatus in the 76 millionth part of a second means, and during that time to take a distinct impression, it must be stated that in ordinary so-called instantaneous photography (of living moving objects, &c.) this time fluctuates mostly between the one-twentieth and the one-sixtieth part of a second, and has never as yet even been compressed within the one-hundredth part of a second.

The second of the difficulties already mentioned is known to any one who has at all busied himself with instantaneous photography; he will have learnt how difficult it is, for example, to fix in the exact centre of a plate a horse trotting past the apparatus, he generally exposes either too soon or too late. How much more difficult, therefore, must it be to deal with a projectile moving with a velocity of some 400 metres in a second, especially when the object field of the apparatus only covers about 15 metres. Herr Anschütz has, in order to meet the difficulty, so constructed his apparatus, that the projectile itself, by tearing away a wire net, and by so doing breaking an electric current, brings into action an instantaneous closing arrangement, and in this manner, have due regard to the time which the release and working of the arrangement requires, the certainty is offered that the projectile will pass the field of the instrument at the exact moment when the mechanism for the instantaneous exposure and covering of the plate is brought into play.

The principle of construction of such an instantaneous mechanism for work of this kind consists in the main, that a covering disc closing the lens, but provided with an opening at one spot, hangs before the apparatus; it is released by the breaking of an electric current, and when free must attain in falling that velocity, which is required to correspond with not only the velocity of the moving projectile but also the time of exposure rendered necessary by the sensitiveness of the plate, as well as the size of the opening, in order to obtain a clear picture of the flying projectile in the short time which elapses whilst the opening in the falling covering disc passes the apparatus. It is obvious that the bringing into agreement of all these factors, position and velocity of the flying projectile, the direction of the apparatus, point of time and duration of the exposure of the plate, create no light difficulties in the practical working of the scheme; and the completeness of any apparatus constructed for this purpose will be proved by its surmounting or otherwise of these difficulties.

For the case under discussion the question in the first rank is the determining the time which elapses from the release of the disc already mentioned till the moment when the opening in it passes the lens of the apparatus with the necessary velocity, in order to be able to determine the exact spot where the impression must be taken. By application of the spark chronograph this time proved to be 0.28 of a second; in this time the projectile with a velocity of 400 metres a second travelled over 113 metres, and therefore the position for taking the impression was fixed for 113 metres in advance of the frame of the wire net, by passing through which the projectile itself released the covering disc before mentioned. At the height of this distance it was therefore necessary to fix on one side of the path of the projectile a white background, against which the flying shot is shown in sharp relief, while upon the other side of the plane, distant about 80 metres horizontally from it, it is the position which ought to be assigned to the photographic apparatus.

Since Herr Anschütz intended to obtain an image of the shot at four different points, four apparatus were provided, which were so arranged that

each succeeding one worked 0·009 of a second later than the preceding one. For the whole set of impressions then 0·028 of a second was required, in which time the projectile would travel about 11 metres. The background was in consequence of these 13 metres elongated, and upon it, below the line of the projectiles, a scale 12 metres long drawn, so that it would be immediately seen where the moving projectile was at time of each impression. Beneath the centre and two ends of the scale three shot were securely suspended, in order to have a comparison of the pictures of the projectiles, both in motion and at rest, with each of the impressions.

Herr Anschütz had naturally so constructed his apparatus that it would suit any other approximately similar at least to those described, even if the conditions should be changed on account of the time of flight of the projectile; and it needs scarcely to be explained that in consequence of having to work with so minute a limit of time, an arrangement of the apparatus in connection with Siemens spark chronoscope was necessary to determine the fixing and reading off the smallest units of time.

Unfortunately the range of the Gruson factory at Buckau is extremely limited, so the experiments could not be carried out as completely as was intended. The working of the apparatus by the projectile itself could not be managed, as the distance of 113 metres for the projectile could not be obtained, and this was the distance necessary to correspond with the fall of the covering disc. As time was wanting, nothing else remained but to provide the necessary interval for the working of the instantaneous mechanism by arranging for the release of the disc at the beginning of the ignition of the charge, so that during its combustion the disc was already falling. By this arrangement it was necessary to take into account the irregularities which are unavoidable in the ignition and combustion of the charges of guns (which become of moment through the necessity which exists for the most exact agreement in the coming smallest particles of time); and so it resulted unfortunately that in two methods of ignition provided at the experiments, the one acted too slowly and the other too rapidly, with the result that the projectile had either not reached or else had passed the object field of the apparatus at the moment of exposure.

Nevertheless, he succeeded late in the afternoon in obtaining by means of the first apparatus a neat impression of a 25 centimetre long 8·5 centimetre projectile, and thereby proved the possibility of the experiment, although it was accidentally placed in a very unfavourable position in consequence of the position of a beam placed near, which threw a shadow upon the white background.

Unfortunately also the projectile had already reached the end of the object field, so that the remaining three impressions showed only the bare background with the scale and shot at rest.

Both by this one successful impression, as also by those attempts where the necessary agreement between the flying projectile and the working of the apparatus was not obtained, it resulted nevertheless, and this is conclusively the essential fact in regard to the photographic impressions, that with tolerably good sunlight even the uncommonly short time of exposure of 0·000076th part of a second suffices completely with an extremely susceptible plate to obtain clear pictures.

The moving projectile in the unfortunately only single instance of its impression shows in its picture, in comparison with that of the projectiles at rest, a scarcely noticeable indistinctness at both ends, which arises from the fact that, as has been calculated, the shot during the exposure of the plate to the light moved forwards about 3 centimetres. A staff to be shot away is placed before every projectile in the direction in which it travels, and is distinctly visible in all four pictures, indicating clearly in its different

assumed positions from its breaking and during its following fall, that the harmony of the four apparatus was complete and that they acted well.

The proof of the possibility of the experiment has thus been made. It is, in fact, much to be wished that Herr Anschütz should be placed in a position to continue his work much further; we should then receive more exact information in regard to the trajectories of projectiles on many points now shrouded in uncertainty. There is, no doubt, that this art of instantaneous photography, which is still in its infancy, is destined under skilful hands to undergo large development, which will place the whole science of ballistics upon a more thoroughly secure foundation of experiment and tangible fact, than the airy and hypothetical grounds on which it now rests.

Some time ago Professor Mack, of Prague, succeeded in photographing rifle bullets in motion quite distinctly by help of the Töpler-Schieren method, which is the result of experiments carried out during many years by Dr. Töpler, one of the professors at the Polytechnikum at Dresden, with various lenses, in order to bring under proper examination rays of light under different phases of refraction, and by this means it has been rendered possible to examine the cushion of air which surrounds a projectile flying at a high velocity. These bullets were fired in a darkened room, and in consequence of their small range offered the advantage, that a momentarily appearing electric spark could be used as a source of light; with such an arrangement naturally the complicated mechanism for bringing the time of exposure of the plate into agreement with the flight of the projectile becomes quite superfluous, as the open apparatus can only receive the impression during the short moment in which the electric spark conveys the light to it, while simultaneously illuminating the bullet flying past it.

Whether a corresponding arrangement can be made applicable, and an electric spark suffice to illuminate sufficiently artillery projectiles must reasonably be doubted; fortunately Herr Anschütz's experiments have shown that as simple a method for photographing large projectiles exists, and that not only distinct impressions of the projectiles in motion can be taken in series, but also simultaneous impressions of one and the same projectile at the most different points of its path, at the moment of its striking and penetrating armour, and in the case of shell at the moment of bursting.

We hear that Herr Anschütz has had the honour of laying before the Kaiser at Müncheburg on the occasion of the manœuvres his first successful impression of a projectile in flight. May this be a good omen for the further progress of its efforts, and may also the necessary means not be wanting for the carrying on of his important and costly experiment.

H. G.

THE DRILL REGULATIONS OF THE GERMAN FIELD ARTILLERY.

Translated by Lieut.-Colonel WALFORD.

PART IV.—THE FIGHT.¹

.1 *Introduction.*

IN order to ensure uniformity with the conditions of war it is necessary, while carrying out the Exercises, to pay careful attention to the correct choice of formations with reference to the special duty of the moment, and at the same time to take advantage of the character of the ground. The selection must be such as will tend to give the greatest effect to our fire, and to diminish the value of that of the enemy.

It must be remembered that the formations and principles laid down in the Regulations take into consideration only the most simple conditions, and that when applying them before the enemy, circumstances will often necessitate some change in them. As such a change may result at any moment from an alteration in the character of the action, all commanders, in their several positions, must be practised in accommodating their orders, quickly and without hesitation, to the phase which for the time being may exist, and must ever feel convinced that *omission and neglect are far more injurious than any mistake in the selection of the form of action.*

In accordance with the general principle of advancing from that which is easy to that which is difficult, all Exercises are to be carried out (assuming some simple tactical condition), first in the battery and afterwards in the brigade-division and larger units ; also at the commencement over open and easy ground, and finally in difficult country. Complicating circumstances of all kinds, especially the conduct of an action under conditions involving heavy loss, are to be gradually taken into account.

2. *Division of Command.*

The commander of a force of artillery which is attached to a body of troops will, up to the beginning of the fight, remain with the commander of that body. He will then take over the command of his force (or of the larger fraction of it, if it be broken up), but will, nevertheless, keep up continual communication with the commander of the troops.

If during the course of the fight any batteries or parts of batteries come into action on a position where a brigade-division or battery which belongs to another unit is present, they will, until a change of position takes place, pass under the command of the commander of the said brigade-division or battery.

On the same principle, batteries which belong to a cavalry division will, when they are employed in combination with other artillery, pass under the command of the senior artillery Officer on the spot.

The battery will always, the brigade-division will only as far as is convenient, be worked by words of command, trumpet-calls, and signals. When a yet larger unit is employed, directions and orders will take their place.

Trumpet-calls are to be used as little as possible.

Every Officer and non-commissioned officer is, as a special duty, to provide

¹ Continued from No. 149.

for the *immediate* execution, within his command, of all orders relating to halting and forming line.

For the carriage of the more important verbal orders, Officers are, whenever possible, to be employed ; otherwise orderlies may be used. The latter must, however, be so far advanced in their training that they can understand the sense of such orders as they receive.

3. General Principles.

The Field Artillery will usually open the battle. It is thus, in most cases, of importance to deploy at the very commencement a *superior number of guns*, and to be in a position to early develop an *effect in mass*.

Artillery will, as a rule, be used in units of brigade-divisions or regiments ; the employment of individual batteries will be the exception. Only under very special circumstances should a battery be broken up.

Since the *choice of the first artillery position* is frequently decisive as regards the deployment of the whole force, but is also always dependent upon the intentions of the commander of the troops with respect to the action, the Officer commanding the artillery must take his orders with regard to it, and also as to the strength of the unit of artillery which is to be first brought up.

The *fire-effect of artillery* should undoubtedly be principally used at ranges which lie *beyond the zone of the effective fire of infantry* ; but it must be remembered, as a principle, that the latter can never dispense with the aid of artillery. For this reason the *artillery should not, at decisive moments, avoid even the very heaviest infantry fire*.

A *special escort* for artillery is not usually requisite. It is the duty of any bodies of troops which may happen to be in the neighbourhood of a threatened battery, to give it their aid.

A *battery which has expended its ammunition* is not to retire ; it is to wait in its fire-position until fresh ammunition has been brought up.

Batteries which are under fire are not to be withdrawn, but are to be reinforced by the advance of fresh ones. Even very heavy loss affords no reason for the abandonment of a position.

As a matter of principle, movements *in retreat* are to be begun *at a walk*.

It is often impossible to avoid firing over our own troops, but this is nevertheless only to be permitted when the artillery commander, after a careful estimate, is convinced that there is no risk in it.

In addition to the precautions taken by the other arms, artillery must guard itself against surprise. This is especially the case with regard to a flank left unprotected after the fire-position has been taken up. Every flank battery is, without any special order, responsible for due observation on the flank.

Horse Artillery batteries are particularly suited for quickly supporting any threatened point, or for taking advantage of a favourable phase in the action.

4. The Assembly.

The choice of the formation for the assembly will be governed by the proportion of the force to that of the other troops, the available space, the character of the ground, and the need for supervision.

If the 2nd Line of wagons is with the battery, the battery commander will direct whether it is to stand on the flank or in the rear of the fighting-battery. In the case of larger units the senior commander will regulate this question.

5. *The Choice of the Fire-position.*

Every artillery position must be reconnoitred by the commander, who must hasten on ahead for this purpose. He must take care that the attention of the enemy is not prematurely drawn to the position which is to be taken up. The actual inspection of it should, under certain circumstances, be carried out on foot, or such persons as accompany him should at least be left behind.

In the case of a *retirement* an Officer is to be told off to inspect the new position; he will receive general directions from the commander, who will remain with the guns.

The selection of a correct front is of particular importance, since a change of front by artillery which has once taken up a position, breaks off the fire, and can frequently, especially when the line of guns is of great length, be carried out only with considerable loss.

When selecting a position considerations respecting the effect of fire are, as far as possible, to be taken in conjunction with those affecting cover; but of these the former are the more important.

The first necessity is an extensive and open field of fire, together with ample space; it should, for choice, be possible to command the country up to within the shortest ranges, and we further need level ground for the guns, facility for supervision, and a line of front not too irregular, and as nearly as possible at right angles to the line of fire.

The most advantageous position is one in rear of the crest of heights, such that the muzzles of the guns just overtop it; the 1st Line of wagons should be in rear and, whenever practicable, under cover in rear of a flank.

Wet or broken ground before the front is favourable, if it does not seriously affect our own power of movement.

Screens are advantageous only when they are at least from 100 to 200 metres in front of the battery.

It is a disadvantage to stand in the immediate neighbourhood of particularly conspicuous objects, or a little in front of them, since they aid the enemy to observe his fire.

Positions for the guns which rise considerably to the rear assist, especially on hard ground, in diminishing the recoil. If such positions cannot be found, the brakes, must, as an exception, be used; but they tend to wear out the matériel.

Earthworks to give cover (especially to the men) from the enemy's fire, are always useful, when time permits of their construction. They should be used on a large scale in positions prepared beforehand for defence; cover for limbers or ammunition wagons can be employed only in positions prepared long beforehand, or in siege warfare.

Battery intervals of from 30 to 50 paces are advantageous to the conduct of fire. If necessary the gun intervals may, in order to permit of their use, be first reduced to the minimum of 10 paces.

Even larger intervals are desirable between brigade-divisions.

It will be necessary, particularly when in great strength, to pay attention to a *similar diminution of the extent of front*, as only thus can sufficient space be obtained, without mixing the various artillery units, for the batteries which will come up later.

The posting of several batteries in line or echelon will be governed by the character of the ground, by the direction of the wind, and frequently by the estimated course of the action. If space be wanting, it may be of advantage to place a second line of guns in rear of the first, if the ground allows of such an arrangement.

The conduct of fire should not be made more difficult by placing the echelons too far apart. The intervals between the echelons must not be so

small as to lead to any risk to the foremost lines ; they may, nevertheless, be considerably less than the distance between them. When the numbers are large, it will, in most cases, be necessary to echelon by brigade-divisions.

The use of echelons is favourable to the conduct of fire, if the wind blows the smoke *in rear* of the nearest echelons.

6. *The Advance into the Fire-position.*

Every portion of ground which has to be crossed must be *reconnoitred with respect to the enemy, and also with regard to the possibility of traversing it*. Even though the former is, strictly speaking, the work of the other arms, yet the duty lies with the artillery to protect itself by its own reconnaissances against any attack by surprise. Reconnaissance with respect to passability is certainly the duty of the Field Artillery itself, and falls to the share of the leading battery, so long as the several batteries are one behind the other.

The scouts told off for this purpose must remain in close communication with the battery, and must immediately report anything of importance which they observe, or must convey this information by preconcerted signals. In addition to such general care, particular attention must be paid to the direction in which fire is to be opened, &c.

Roads are to be used as much as possible for the advance. A simultaneous advance by parallel roads is advantageous, as is also, when it is practicable, the shortening of the column of march by the use of section-column.

When advancing into position especial attention must be given to taking advantage of cover. With this object it is frequently advisable to move in battery- or brigade-division column until close up to the actual position.

When an approach under cover is not possible, artillery will advance in line against the enemy. A uniform mode of procedure among the batteries is not necessary.

If possible, the batteries will form line beyond the reach of the enemy's fire or behind cover. Repeated changes of formation must be avoided.

For flank movements under the enemy's fire (which as far as possible are to be avoided), the best formation is the battery-column.

The *paces* to be chosen depend entirely upon the intentions of the commander, the condition of the action, and the character of the ground. The main point is the consideration that the horses will have done all that can be asked, when they have brought the guns into position, even if to do so requires the expenditure of their last effort.

Especial importance is to be attributed to a *covered advance into position, and to an opening of fire, which shall, as far as possible, surprise the enemy*. Where there is no cover available, this effect must be obtained by rapidity of movement.

Under certain circumstances, and in order to provide for the simultaneous opening of fire, and for quiet and order while moving into the fire-position, a *preparatory position under cover* may be first taken up. The nearer this is to the rear of the fire-position the better.

No binding rules can be given for the formation of the batteries in the preparatory position.

All preparations for action, such as loading the guns (if by any chance this has not already been done), setting the tangent scales, clinometers, &c., will be made in the preparatory position ; moreover, the section- and gun-leaders and the laying numbers may be there instructed as to the next task of the battery, if this can be done without attracting the attention of the enemy.

The movement from the preparatory position into the fire-position must be made rapidly, and as far as possible on a full front, in order to surprise the enemy.

Batteries which come up later into action must, on level ground, avoid as far as possible *coming into position close alongside or in line with a target, on which the enemy has already ranged himself.*

When it is intended to advance, the artillery commander must decide, taking into consideration the ground and the condition of the action, at what moment he will call up his brigade-division or battery commanders. The latter especially should not be called up sooner than is absolutely necessary to enable them to receive instructions. When a preparatory position is taken up, the battery commanders should not be summoned until the batteries have occupied it. The battery commanders will, either personally (dismounted) or by a dismounted subordinate, ascertain whether from the selected fire-line the target can be seen over the sights with the tangent-scale down.

The commanders, who have ridden on in advance, *remain in the selected position* and watch the enemy, while the *battery commanders, as a rule, themselves bring up their batteries into position.* Whether and how the chosen position is to be indicated, is settled according to the circumstances of the moment.

When the nature of the ground renders necessary a careful choice of position for each gun, the gun-leaders may be taken beforehand for this duty, if it can be carried out without attracting the attention of the enemy. The gun-leaders (dismounted) seek for the most suitable posts for their guns. Equal intervals between the guns are not necessary. The section commanders remain with the battery: the gun-leaders (dismounted) wait for the battery to come up, and give their guns the words of command to halt and come into action.

Coming into action to a flank has many advantages with respect to making use of the character of the ground. Under certain circumstances the guns may be reversed, even when advancing, and be brought into action rear. It may also happen that it may be desirable to use various methods of coming into action in one and the same battery.

When the position is on a height, the crest should not be approached before opening fire. The guns will, after coming into action, be run forward simultaneously until the target is visible over the sights with the tangent-scale down.

Direct fire is to be preferred to indirect; but the latter must be used when the ground or the phase of the action does not permit of direct fire.

7. *The Renewal of Ammunition, and the Conduct of the Limbers and Lines of Wagons.*

The punctual supply of ammunition is of the highest importance. It is carried out from—

1. The limbers.
2. The 1st Line of wagons.
3. The 2nd Line of wagons.
4. The nearest ammunition-columns.

The ammunition for the first rounds will be taken from the limbers. If the ammunition-wagons have come up to the guns, the limbers will, as a rule, be sent back at a walk to the 1st Line under command of the quartermaster-sergeant; they will there be refilled with ammunition when the wagons come up from the 2nd Line.

In the case of fire-positions, which there is every reason to suppose will be occupied for only a short time, the limbers may, as an exception, remain with the guns, and the ammunition-wagon with the first line.

The 1st Line, and the *limbers* which have been sent back to it, will, if possible, be placed under cover from the enemy's fire, or at least from his

view. If no cover can be found, a position will be chosen about 200 metres in rear of the fire-line, such that the effect of the enemy's fire, when ranged on the guns, may be to some extent avoided. A greater distance than this is not advisable, as in case of need the limbers must be close at hand.

No exact rules can be given with regard to the position in open ground ; but close formations should not be used. In most cases the column of route will be advisable, and a position to the rear and flank of the battery.

When behind cover any formation may be taken up ; as an exception the limbers may even be separated from the 1st Line, provided always that they can get to the guns quickly and without crossing each other.

The position of the 1st Line will be ordered by the battery commander. If in the course of the action it is necessary to change this position, his orders are to be taken in the matter.

If the batteries are fighting in brigade-division, the brigade-division commander gives general directions with regard to the positions of the 1st Lines ; under certain circumstances they will be collected in one place. The battery commander attends to the selection of the actual spot which is most suitable.

During an ordinary march (*Reisemarsch*) the 2nd Lines remain with the batteries.

When an engagement is probable (*Kriegsmarsch*) they will be collected by brigade-divisions under an Officer, and will march immediately in rear of the independent unit, *e.g.*, the advanced guard, the corps artillery, &c.

Carriages belonging to other bodies of troops may be attached to these Lines in the case of cavalry divisions only.

Under special circumstances the 1st Line of wagons may be strengthened by the addition of some ammunition wagons from the 2nd Line.

As soon as the 2nd Line is separated from the batteries a non-commissioned officer of that Line is to be told off to the brigade-division commander for the purpose of carrying orders.

The brigade-division commander is responsible for the punctual arrival of the 2nd Line. He gives orders as to the point to which it is to advance, or, in the case of a retirement, to which it is to fall back.

But, on the other hand, it is the duty of the Line commander to bring up the wagons to the field of battle without any special order ; in order to do this he must frequently display very great zeal and energy. He must report to the brigade-division commander his advance and his eventual position.

The 2nd Line takes up a post in rear of the fire-position ; this should be easy to find and very accessible, and should have good communication by road with the batteries ; this communication should, if necessary, be improved. But all main roads must be left free in order to avoid obstruction.

A safe distance for the position, of which nevertheless the selection must depend entirely upon the character of the locality, will be at about 800 metres from the fire-position. The formation which the 2nd Line will take up will be governed solely by the ground and by how best to take advantage of cover.

As soon as the 2nd Line has reached its post, the Line commander, unless otherwise ordered, will send up three ammunition-wagons for each battery to the 1st Lines.

The further renewal of ammunition from the 2nd Line is to be carried out under orders from the brigade-division commander. It is his duty to arrange, in good time, for the supply of everything which can be required by the batteries. Only such batteries as have their fire-position at an exceptionally great distance from that of the others, and who are for this reason specially named by the brigade-division commander, may communicate immediately with the commander of the 2nd Line.

The Line commander, so long as it is in his power, always sends to each battery the ammunition-wagons which belong to it.

Demands for ammunition from batteries which do not belong to the brigade-division, must be, as far as possible, satisfied by the commander of the 2nd Line ; but he must at once report to the brigade-division commander *how he is situated with regard to this supply, and how many filled wagons he has with the 2nd Line.*

The empty ammunition wagons of the 1st Line fall back at once to the 2nd at a trot. As the commander of these wagons, and also of all movements of wagons between the two lines, each battery is, as far as possible, to make use of the non-commissioned officer who brought up the first three ammunition-wagons from the 2nd to the 1st Line.

The commander of the 2nd Line will send his empty ammunition-wagons by sections to the nearest ammunition-column to be refilled. He will be informed by the brigade-division commander with regard to the position of the latter ; but it is, nevertheless, his duty to search for it himself.

If the course of the action necessitates a more rapid renewal of ammunition, full wagons may, as an exception, be temporarily sent from the columns to the batteries.

When batteries are acting independently, the renewal of ammunition is governed by the foregoing rules.

It is the especial duty of the commanders of lines and of sections of wagons to keep up the most perfect discipline and order. Any disorder among the carriages in rear of the line of battle may produce the most disastrous results by blocking up roads and defiles.

8. The Conduct of Fire.

The commander of the troops decides upon the object of the action, and, therefore, broadly, the target of the artillery.

The division of the target, in detail, among the several batteries, and the character and course of the action, are the business of those who conduct the artillery fire.

Without any consideration as to contingent losses, that target is always to be attacked which is decisive for the particular phase of the action which prevails at the moment.

At the commencement of the battle this will, in most cases, be the enemy's artillery. Fire will be directed first on those batteries whose effect is most felt, or whose successful silencing appears most easy.

If infantry form the target, then, unless large columns can be satisfactorily fired on, the enemy's firing-line should be attacked in such a manner, that as far as possible every portion of it shall be under fire.

Cavalry can, at long ranges, be effectively fired on only when they present themselves in masses. A charge must be beaten back by a rapid fire.

It will frequently be advisable to fire on the *staffs of the larger units.*

The effect of artillery will be much increased by the simultaneous and sudden opening of a well-prepared fire (which shall surprise the enemy), conducted by one head. If we require a quick and decisive result, we must combine many batteries against the same target.

In the brigade-division the fire will be conducted by the commander, but the independence of the battery commander is nevertheless to be preserved as far as possible.

It is in general impossible to avoid distributing the fire on several targets, as otherwise individual brigade-divisions of the enemy would be left in undisturbed activity. But such a distribution should never degenerate into a purposeless splitting-up of the fire, since superiority in the number of bat-

teries finds its effective expression only by means of the combination of their fire. Even where there is no superiority in strength, we must endeavour to obtain temporarily a crushing effect by concentrating the fire against a part of the enemy.

It is the duty of the battery commander to range the battery. The brigade-division commander will interfere only in rare cases, when he has convinced himself by trustworthy observation that the target which has been given is not properly understood, or that the ranging is incorrect.

The simultaneous ranging of several batteries on the same target is only to be allowed when the shots of the individual batteries can be clearly distinguished from each other.

Observation from a post on the flank may be of use. Recognised effect gives the most trustworthy information. The accuracy of the ranging may occasionally be judged by comparing the ranges, as found by the various batteries, taking into consideration the lie of the target and the position of the batteries.

When firing common shell, the limits of the bracket, as soon as it has been found, are to be reported to the commander of the brigade-division upon the prepared cards. In this case it is to be noted whether, and how many, "Aufsatzplatten" are used, whether the range has been found with the clinometer, and what is the angle between the line of sight and the horizontal.

Every battery which newly arrives, or which changes its target, must be informed by the brigade-division commander of the range which has been found.

All questions as to the target and range are to be addressed to a section commander, in order that the battery commander may not be disturbed in his conduct of fire. Attention to the words of command, and looking over a gun which has been laid, will frequently afford the required information.

The battery commander regulates the *order of fire*.

An economical use of ammunition is strictly ordered. The expenditure of ammunition and the rapidity of the fire are governed by the object of the action and the importance of the target.

In a delaying action the intervals between rounds will be lengthened; but at the moment of the decision, or to take advantage of a passing phase of the battle, or in close fighting, they will be made as short as is compatible with a trustworthy service of the guns.

In "ordinary fire" a battery of 6 guns will, on an average, fire one round every 15 or 20 seconds.

Common shell are effective against all targets, but are least useful against firing lines lying down and targets which are under cover. They may be advantageously employed in ranging, and also against moving targets.

Shrapnel are adapted, owing to the great depth of their area of effect, for use against all living targets, and also against attacks at short ranges and targets which are behind cover.

Case serve for defence against an attack at short ranges; and are effective up to 300 metres.

The *selection of the projectile* is the business of the battery commander. The brigade-division commander must nevertheless interfere under certain circumstances; for example, he may direct a battery to continue to fire common shell, in order to obtain better observation of the shots, when several batteries are firing at the same target with shrapnel.

Every *change of target* is to be ordered by the brigade-division commander. Since as a rule a new ranging (which will take time) will be necessary, a change of target is not to be made until the desired effect on the former target has been fully obtained.

In the case of threatening danger the battery commander must order independently a change of target and of projectile.

9. *The Renewal of Ammunition and the Replacement of Casualties under the Fire of the Enemy.*

Every battery must, under all circumstances, bring the whole of its guns as quickly as possible into the fire-position. No attention is to be paid to injuries and losses which do not absolutely prevent the advance of the guns.

If a gun has become incapable of movement, the section commander is to give the requisite orders for it to be brought up, but is himself to go forward with the serviceable gun into the fire-position. The gun-leader of the gun which has been left behind arranges for the quickest possible restoration of its capability to move. Under certain circumstances it may have to be brought up by a diminished team, or even by the detachment alone.

Every battery which is under fire must, with all its power, and by the use of its whole matériel (including that of the 2nd Line), keep up a fire from every gun without cessation.

In a similar manner the mobility of the limbers is to be kept up by every available means.

The section commanders and the commanders of Lines of wagons give all orders needed for the renewal of ammunition and the replacement of casualties.

The detachments must be carefully trained beforehand in replacing casualties without orders.

If a battery cannot itself supply the necessary renewal of ammunition, the brigade-division commander shall arrange for assistance from another battery.

Even batteries which do not belong to the same brigade-division are, whenever it is in any way possible, to afford such aid.

10. *Change of the Fire-position.*

No change of position is to take place without the sanction of the Officer commanding the body of troops to which the artillery is attached; such permission may, in case of need, follow the movement. Only when the condition of the action calls for an immediate advance may this rule be neglected; in this case the independent intention is to be reported.

Small changes of position, which are necessary for this or that battery in order to obtain better effect or cover, are not considered as a change of position in the above sense.

Every change of position interrupts the effect of fire. Such a change is therefore to be made only when the object of the action demands it.

Before every change of position the guns are to be loaded with common shell.

It will be impossible, under certain circumstances, to avoid taking batteries out of the fire-line, in order to employ them in another position.

A single battery is to move as a whole into a new fire-position. If the collected force of artillery be stronger than this, it will, as a rule, advance or retire by echelons.

In order to avoid loss while changing position, it is advisable to limber-up without the enemy observing it; this can frequently be done by previously running back the guns.

11. *The Attack.*

In considering the attack, a distinction in principle must be made between an accidental encounter and an attack on an enemy who has already deployed.

In the case of an *accidental encounter*, which develops from the column of march against an enemy who is himself still forming line, the advanced guard should secure time and space for the deployment of the main body. This task falls in an especial degree to the field artillery. The better this arm succeeds in carrying on the action at first without the aid of any considerable force of infantry, the better will it secure freedom of decision to the commander of the troops.

For the purpose of carrying out the attack, it is of the greatest importance that the enemy's artillery shall be kept in check from the very first. *Quickness in movement and in ranging may create a superiority, which the foe will find it difficult to equalise.*

This task will be easier if our deployment is already further advanced than that of the enemy. If, on the contrary, the enemy is beforehand with us in this, and is already partly in position, the *decisive* artillery fighting, so far as is compatible with the task of securing the deployment of the main body, must be postponed. It should not be undertaken until we have approximately an equal number of guns in readiness for action.

The attack on a *fully developed*, and perhaps even *prepared, defensive position* requires that the deployment shall in essentials be completed before beginning the action, and the main mass of the artillery must, at all events, be on the spot.

A concerted attack can be expected to succeed only when the efforts made to attain the necessary superiority of fire are themselves successful; this applies first to the artillery fire. To this end every battery must be brought up into position.

The difficulty of getting over level ground which is commanded by the fire of the enemy may oblige us to make use of darkness in order to get near him. We should usually in such a case get forward on the preceding day to the boundary of the enemy's zone of fire, bring up the batteries into a selected, and if possible prepared, position, and commence the struggle as soon as there is sufficient light.

The distance from the enemy at which the *first fire-position* should be selected depends upon the intentions of the commander, the conditions of the action and the character of the country. In the case where it is impossible to silence the enemy's artillery from the first position, we must advance to within an effective range.

As soon as the enemy's artillery fire has been got under, and the *commander of the troops has determined which portion of the enemy's positions he will attack, a crushing artillery fire (as far as possible from encircling positions), must be concentrated on it*, whilst a part of the batteries fulfils the task of keeping in check the artillery of the enemy, especially so much of it as can bear upon the field of attack.

If, after the commencement of the infantry attack, batteries of the enemy enter, or return to, the struggle, and fire on our artillery, the main strength of fire must nevertheless continue to be devoted to the support of the infantry attack.

It is of advantage if the fire on the point of attack can be directed from a flank, since in that case a change of position will be unnecessary, so long as an accurate conduct of fire with reference to the following—distinguishing between friend and foe, the spread of the shell, the observation of the fire, &c.—may render any danger to our own troops impossible.

As soon as the attack draws near to the enemy's position, the ground in rear of the latter must be brought under fire, in order to hinder the advance of the enemy's reserves.

To *correctly assign the various "rôles"* with regard to this question, is one of the principal duties of the higher ranks of the artillery. To do so requires

a knowledge of the intentions of the commander of the troops, and also a clear judgment as to the state of the action.

It is advisable, in order to assist the *infantry attack*, to cause *its advance to be accompanied by single batteries up to the very closest and most effective range*. The strengthening, especially in "morale," which the attack will experience from such an accompaniment will fully outweigh the consequent losses of the artillery.

If the result be victorious, the *first pursuit with fire* will take place. In this the artillery in extended mass will assist. Part of the artillery must, as soon as the victory is recognised, hurry on to the front into the captured position, in order to aid the infantry in retaining it. This is one of those cases where the artillery commander must himself decide to make a change of position, even if no order to that effect has yet reached him.

As soon as the yielding enemy draws back beyond the most effective zone of fire, the *mass of the artillery* must follow at a rapid pace, must beat down the foe with fire, and must not allow him either to halt or re-form.

If the infantry attack fails, the artillery, especially those of them who are farthest to the front, must receive the retiring infantry and beat back the pursuit of the enemy.

12. *The Defence.*

In most cases the field artillery will be ordered at first to *take up a preparatory position*, even though the fire-position be artificially strengthened. In this manner only can it be made certain that the artillery will place itself opposite to the correct front of the direction of the attack, and will not be obliged early to change its position. The enemy will thus also be best prevented from obtaining an insight into our plans and intentions before the opening of the battle.

As soon as the general direction of the enemy's attack is recognised (and, if possible, before he has brought up his batteries), the fire-position will be taken up.

A personal inspection beforehand of the position, an improvement of the communications within it, and a knowledge of the various ranges (especially those of the foreseen artillery position of the enemy), are advantages which the defender must not neglect.

When preparing positions, the fullest use is to be made of *earthworks to cover the guns and detachments*. If there be sufficient time, the field of fire must be improved by cutting down hedges, trees, &c. ; it is also advisable to construct screens, in order to render the observation of fire difficult to the enemy. It is of the greatest importance that very large supplies of ammunition should be placed in readiness in the immediate neighbourhood of the guns.

The commander of the troops will, as a rule, order the first shot to be fired. A premature opening of fire at too long a range and on small bodies of the enemy, should be avoided, since the enemy will thus easily obtain an insight into our position.

As a rule the action will commence by a combat with the *artillery of the attack*, and the *whole of the artillery should generally be brought into action*, in order to endeavour to obtain a superiority over the assailant.

The struggle with the enemy's artillery should continue until his *infantry advances to the attack*. After that, the artillery (if necessary abandoning their cover for the purpose) must take the infantry as their target, without paying any attention to the fire of the enemy's guns. If it be possible to do so, the hostile batteries should be occupied at the same time, but the *combat with the infantry attack will always be distinctly the main point*.

If, before the commencement of the infantry attack, the enemy's artillery

appears to be getting so much the upper hand that a continuation of the artillery duel promises no good result, the batteries may, by the order of the commander of the troops, be drawn back temporarily out of the reach of the enemy's fire. But as soon as he pushes on to the decisive attack, the artillery must, even without any special order, move up every gun at once into action against the enemy's infantry only, paying no attention whatever to the artillery fire of the foe.

If nevertheless the attack succeeds, a part of the artillery must hinder the advance of the enemy's batteries into the captured position, while another part concentrates its fire on such of his infantry as have forced their way in, in order, in combination with the reserves, to drive him back from the position which he has occupied. This is one of the phases of battle in which a *steadfast endurance up to the last moment* is required, and it is then in the *highest degree honourable if this be carried to the length of losing the guns.*

13. *The Pursuit.*

When after the success of the main attack the batteries have got up into the enemy's position, the field artillery must be at once specially employed, *with an utter disregard of consequences, in reaping the fruits of the victory in the pursuit.* It is peculiarly suited for this purpose, since it combines rapidity of movement with power of fire.

The first commencement of the pursuit is a general advance of the victors, which should be continued as long as their strength will in any way permit. During this above all things the *whole of the artillery must be brought into, and be kept in, action.* It must as far as possible *go in to the most effective range from the enemy.* It must hinder by the fire of masses any new taking up of a position by the enemy, and must beat down with fire such of the retiring columns as are still in order. This may be done even at the longest ranges, and directions will often be given to take the more distant fractions as the target, since demoralization there most easily sets in.

We must frequently give up all idea of preserving the cohesion of units. A rapid advance is the only thing necessary, and all means are permitted to facilitate it. The order with regard to individual changes of position can no longer be adhered to ; upon this point the decision of the commanders, even down to the battery commander, will rule.

Flanking fire will be particularly effective. Horse artillery in combination with cavalry is specially suited for pressing upon a line of retreat.

14. *The Retreat.*

If an action has to be broken off, or if the result of a combat be unfavourable, the artillery can render special service, *if it resists the enemy without any regard to the consequent loss of guns,* and beats him down with its fire. In open country it alone can hold off the powerful fire-effect of a pursuing enemy so far from the columns of march (which are being formed under serious difficulties), that an ordinary retreat may generally be possible.

Positions in rear of defiles are especially favourable, as are also those from which a retirement can be made without the enemy perceiving it.

It is of especial importance to provide for the *security of ample supplies of ammunition,* for the complete reconnaissance of the roads of retreat, and for the discovery of several parallel roads by which to pass to a new fire-position.

Increased attention must be given to the flanks, since from them threatens the most dangerous influence on the retreat.

In the case where suitable flank positions can be found, immense assist-

ance can be given to the retreat from them, since they oblige the enemy to spend time in making changes of front. Horse artillery is especially suited for employment in this manner, owing to the long distances which must be traversed in order to make use of such flank positions.

15. *The Action of Horse Artillery in Combination with an Independent Force of Cavalry.*

The horse artillery which is attached to an independent force of cavalry is intended to increase the offensive strength of the cavalry, and moreover to supply it with the requisite power of fire for the defence.

The duties which devolve upon the horse artillery can only be fulfilled if it be sufficiently mobile to be able always to follow the cavalry, and if it be sufficiently skilled in fire to be able to obtain effect during the duration of their action, which is generally very short.

In the *reconnaissance duty* of cavalry the horse artillery will most frequently be of use in overcoming the resistance of the enemy at defiles or in occupied localities, or on the other hand in increasing the power of resistance of their own force at such places.

In a *combat of cavalry against cavalry* the artillery must move into position as early as possible, in order to support first the deployment and then the charge of the cavalry. The fire-position will be selected as may best suit the task to be performed, and should be considerably to the flank of the advancing cavalry, since from such a position it will be possible to carry on the fire until immediately before the two forces come in contact, while the enemy can thus be prevented from turning the flank in question. A position which is secure against a direct attack is desirable, but in this matter also all considerations regarding cover must be subordinated to those connected with effect.

The *concentration on one spot* of all the batteries present is recommended, since numerous lines of fire will limit the movements of the cavalry, while, owing to the shortness of the time available, a concentration of fire can be obtained only by a concentration of position; again, separate positions will necessitate more numerous precautions for the immediate safety of the artillery.

A change of position will almost always be rendered impossible by the rapid course of a cavalry combat.

If the enemy's cavalry be within effective range, the fire will be directed on them, the hostile artillery being entirely neglected, and the whole effect will as far as possible be concentrated upon the principal mass of the enemy.

If its own cavalry is not yet in a position to carry out its attack, the artillery may endeavour to draw off the fire of the enemy's artillery from the cavalry and on to itself.

As soon as the two masses of cavalry have met, and if no fresh force of the enemy's cavalry offers a favourable target as it comes up, the artillery will turn its fire on to the enemy's batteries. But nevertheless the cavalry fight must be continually watched, and every opportunity of assisting in its approaching decision must be seized. If the charge succeeds, the artillery will follow its victorious cavalry, in order to come into action as soon as the enemy rallies for fresh resistance, and in order to pursue him with fire.

If the charge is repulsed, the artillery commander must decide whether he ought to remain to the end in his fire-position, or whether he would do better to fall back into a position in which he may receive his cavalry. Owing to the short time available, it will be impossible to wait for orders on this point. Then, if ever, is the *moment for resolute action*.

COLONEL v. LÖBELL'S¹ ANNUAL REPORTS UPON THE
CHANGES AND PROGRESS IN MILITARY MATTERS DURING
1888.

Compiled by Colonel H. HILDYARD.

THE present publication is the fifteenth issue of Colonel von Löbell's valuable military compilation, a work that has done more than any other published in or out of Germany for the student of contemporaneous military matters. As year follows year, the regular appearance of Colonel von Löbell's well-known green book is welcomed throughout the military world, as a trustworthy guide and record regarding every change of any importance, whether it be in the organization or the administration of armies, in their armament or equipment, or in the ever-varying phases of the tactics employed by the several arms. The detailed manner in which each of these subjects is treated, while enhancing in a high degree the intrinsic value of the work, has the single disadvantage that its bulk has hitherto stood in the way of a complete translation being made of it into our own language. It is the object of the present *précis* to remedy in some degree this disadvantage, by placing within reach of those who are debarred from consulting the original a short summary embracing those points that appear to be of particular interest. But in doing this we would again urge those Officers who are acquainted with the German language—and they are happily a constantly increasing number—not to content themselves with this necessarily imperfect abstract, but, on the contrary, to make a serious study of the work in the original.

The same arrangement has been followed in the latest volume as in previous years. The first part treats of the individual armies of Europe, and elsewhere, Asia, Africa, and America being each in some degree represented. This part forms the largest portion of the work, and occupies 300 pages. Of these, Germany monopolises 40, France 39, Italy 37, Russia 32, and Austria 24, the remainder being distributed over a number of States in all parts of the world. Amongst these may be noticed the Congo State, the armed forces of which are recorded as not without interest at a time when Colonial enterprise has so many sympathisers.

The second part deals with the several branches of the art of war. It embraces the tactics of infantry, cavalry, field artillery, and fortress warfare; the development of small arms and the situation of each of the European armies in regard to the re-armament of the infantry; the progress of military telegraphy between 1886 and 1888; and, lastly, a record is given of the military literature published during 1888.

The third and concluding part embraces ordinarily an account of the military operations conducted during the year. But on the present occasion there are none considered of sufficient importance to warrant special record here, though elsewhere the late operations at Sikkim and the Black Mountain Expedition are briefly referred to. The third part is therefore restricted this year to the obituary notices of General and other distinguished Officers,

¹ *Jahresberichte über die Veränderungen und Fortschritte im Militärwesen,* 15 Jahrgang, 1888, herausgegeben von H. v. Löbell, Oberst z. Disp.—Berlin. Ernst Siegfried Mittler und Sohn. 1889. Pp. 596; size, 9.5" x 6.5" x 1"; weight 1 lb. 12 oz. Price 8s.

irrespective of their nationality, whose death was recorded during the year 1888.

Turning back now to a closer consideration of the first part, we find the foremost place is given, as is natural, to the German Army.

Germany.

New Organic Law.—It was the privilege of the Emperor William I, before his death, to affix his signature to the law of the 11th February, 1888, by which provision was made for a material increase to the armed forces of the Empire. The following brief abstracts show the more important of its provisions :—

Article I.—The first sentence of the fifty-ninth article of the constitution of the German Empire, dated the 16th April, 1871, contains the following provision :—Every German capable of bearing arms belongs to the standing army for a period of seven years, as a rule ; from the completion of his 20th year till the commencement of his 28th year—the first three years with the colours, the last four years in the reserve—the following five years to the 1st levy of the Landwehr, and then till the 31st March in that calendar year in which the 39th year of his age is completed, to the 2nd levy of the Landwehr.

Article II. First Section—Landwehr.—The Landwehr is divided into two levies. The obligation to service in the 1st levy of the Landwehr is of five years' duration. The entry into the 1st levy of the Landwehr follows upon the completion of the period of service in the standing army.

The obligation to service in the 2nd levy of the Landwehr lasts until the 31st March of that year in which the 39th year of age is completed.

Article II. Second Section—Ersatz Reserve.—The Ersatz Reserve serves to complete the standing army on mobilization, and to form the units of the Ersatz formations.

Each year so many men are to be allotted to it that the first requirements for the mobilization of the army will be met by seven yearly classes. In the first place, those individuals are to be allotted to it who have been found qualified for military service, but are surplus to the required quota for the colours, through having drawn high numbers.

The further requirements are to be provided from those fit and liable to service who have been exempted from duty with the colours for family reasons, those who have been found conditionally fit and exempted for minor physical defects, and those exempted for temporary unfitness, but who are likely to become efficient.

The Ersatz Reserve men can be called up once yearly to report themselves at the Recruiting Boards that are assembled in the spring. In time of peace they are liable to be called out for drill three times during their service : on the first occasion for a period of ten weeks, on the second for six weeks, and on the third for four weeks. The numbers to be called up to the first drill are fixed in the Estimates. The period of service in the Ersatz Reserve lasts twelve years, dating from the 1st October in the year in which the men become liable to military service. On the expiration of this period the Ersatz reservists who have been trained are passed to the 2nd levy of the Landwehr, and the remainder to the 1st levy of the Landsturm. The division of the Ersatz Reserve in two classes, which has hitherto prevailed, is abolished, and the whole of the men formerly attached to the 2nd class are in future to form part of the 1st levy of the Landsturm.

Fourth Section—Landsturm.—The duty of the Landsturm, in the event of war, is to undertake the defence of the Empire ; in cases of extraordinary emergency it can be drawn on to complete the army and navy. It comprises

all men liable to service from the completion of their 17th year up to 45 years of age who belong neither to the army nor the navy. The 1st levy is composed of those liable up to the 31st of March of that year in which they complete their 39th year. The remainder belong to the 2nd levy, which includes those who have completed their term in the army and Landwehr, and who continue in it until they attain the age of 45. The Landsturm is called up by Imperial decree, but in the event of sudden emergency, this may be done by Generals Commanding, by Governors, and Commandants of fortresses. So far as the military circumstances allow, the men are called out by yearly classes, beginning with the youngest.

Training and Manœuvres.—The new infantry drill-book was issued to the troops on the 1st September, 1888, and was made applicable to the whole of the infantry, including the Jäger and Schützen battalions. On the 15th October, 1890, the Generals Commanding army corps and the Chief of the Staff are to submit their reports to the Emperor upon the experience of the new drill regulations.

New musketry regulations have been issued applicable to the cavalry and the train.

Prizes for good shooting have been instituted for Officers and non-commissioned officers. For the former the prize is a sword, for the latter a watch, one of each being given in each army corps. All Captains and Lieutenants in garrison at the time fixed for the firing have to take part in the competition.

For the manœuvres in the autumn of 1888, the Guard Corps and the 3rd Army Corps were detailed for manœuvres before the Emperor, consisting of a grand parade and corps manœuvres against a marked enemy—each army corps separately—and then three days' manœuvres one against the other. Each of these army corps formed also a cavalry division of six regiments, with two horse artillery batteries for special cavalry manœuvres; but these joined their respective army corps during the period of the Emperor's manœuvres. The rest of the army corps followed the course of autumn manœuvres laid down in the Regulations for Field Duties. In seven of them cavalry long distance rides were practised. A pontoon exercise took place between Thorn and Graudenz, and a siege exercise at the latter fortress, each lasting for fourteen days.

Training of Reserves and Landwehr.—The number of men who had left the colours called up for drill in connection with the manœuvres during 1888 was as follows:—

From the Reserve—	Men.
Infantry of the 1st, 2nd, 5th and 6th Corps	61,500
Balloon detachment	40
From the Reserve and Landwehr—	
Infantry of the 4th, 7th to 11th, 14th and 15th Corps	40,700
Jägers and rifles.....	2,800
Field artillery.....	7,500
Garrison artillery	3,800
Pioneers	2,300
Railway regiment	400
Train	4,683
Total Prussian corps	123,723
And of the Bavarian corps	22,184
Grand total Army Reserve and Landwehr	145,907

The duration of the drills was twelve days, excepting in the case of the balloon detachment, who were up for twenty-eight days.

The number called up from the Ersatz Reserve was :—

	Men.
For a first drill of 10 weeks.....	12,000
„ second drill of 6 weeks	10,700
„ third drill of 4 weeks.....	10,250
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Total Prussian corps	32,950
And of the Bavarian corps	4,810
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Grand total of Ersatz reserve	37,760

The general total, therefore, of the Army Reserve, Landwehr, and Ersatz Reserve called up for instruction during the year 1888-89 was 183,667 men.

Belgium.

The Meuse Defences.—A first credit of 8 millions of francs was taken in 1887 for the construction of fortified bridge-heads on the Meuse. A further credit of 12 millions was taken for the same purpose, besides 800,000 francs for the purchase of ground for a military road between the gorges of the forts. The total expenditure amounts to 33 millions for the forts, 20 millions for their armament and cupola towers, and 900,000 francs for the ground, making a total of 54 millions of francs.

The forts will be constructed according to two different types, each of which will, in a certain sense, be an ideal one. They will embody all the improvements realized both in the science of artillery and construction. The building of these forts has been entrusted to a firm, chiefly composed of Frenchmen, under a contract for their completion by the 31st December, 1890.

Military Establishments.—The zeal of Belgium in improving in every possible way the instruction of her small army is worthy both of notice and of imitation. Notwithstanding the large sums devoted to extraordinary credits for the important works of defence that have been undertaken, money has not been grudged for the enlargement of the artillery practice and experiment ground at Brasschaet, for which purpose a credit of 750,000 francs has been taken. The Infantry School of Musketry has also been reorganized with a view to the instruction being extended, so as to embrace fire tactics under service conditions.

Manœuvres also have not been neglected, two infantry Divisions, with other arms attached in proportion, having taken part in them, and occupied the two last days united as an army corps in the attack of a position marked by troops from the garrison of Antwerp. A cavalry Division, with two batteries attached, was also engaged in manœuvres for fourteen days.

At least once in every year all the mounted troops are exercised in entraining.

Mobilization.—During the discussion of the Budget for 1889, the Minister of War stated the number of men necessary for the defence of the country to be as noted below. He added that these numbers were actually available :—

	Men.
Field Army, consisting of 2 army corps and 2 independent cavalry divisions	70,000
Antwerp (including the mobile troops)	30,000
Termonde	4,000
Diest	4,000
Lüttich (including the mobile troops)	8,900
Namur (" " ")	5,000
Total force.....	121,900

In connection with the efficiency of this force, the deficiency in the number of Officers required is a matter for serious consideration. As many as 300 Officers are required to complete the war strength of the Army, and no less than 900 for the Reserve, which on paper numbers 30,000 men. An attempt was made to provide for these from Officers who had left the Service, and from non-commissioned officers; but this has not proved successful. Neither has, so far, another scheme, by which a new creation, to be termed "volontaires agréés," were instituted. These are enrolled as corporals, and, after an examination, become candidates for Officers of the Reserve. After six months' good service, and undergoing another examination, they are nominated to be non-commissioned officers—in which rank they serve two years before being nominated Officers of Reserve, if considered fitted for their position. They are then dismissed, being liable to be called up in time of war for the whole period of their engagement, and in peace-time for a month's training each year.

The institution is evidently a partial imitation of the German one-year volunteers, but the same excellent results are not to be expected from it, seeing that service in Belgium is not universal. It offers consequently no inducement to the high class of men who in Germany avail themselves of the opportunity offered them to avoid serving for the full legal period. The advantages offered, in short, are not very obvious, and a satisfactory solution of the difficulty existing in regard to Officers for the Reserve in Belgium cannot be expected to result from the course adopted.

Bulgaria and East Roumelia.

The development of the armed forces in this Principality continues, and with the new year the infantry underwent a material reorganization. Whereas it consisted previously of 12 regiments of 4 battalions each, the new organization is to be in 24 regiments of 3 battalions, which entails an increase of no less than 12 regimental staffs and 24 new battalions. A proposal was also made for the increase of the cavalry and artillery; but this was not approved by the Sobranje.

Denmark.

The chief interest continues to be the construction of the works designed for the defence of Copenhagen and its neighbourhood, for the continuation of which a further extraordinary credit was granted. During the year 1888 rapid progress was made with the construction and armament of these works, the condition of which is shown in the following summary.

1st. Works completed.—As regards the sea defences, the two coast batteries at Charlottenlund and Kastrup, regarding which the particulars were given in the Reports for 1886–87, have now been provided with their armament.

As regards the land defences, the works begun in 1886 and 1887, with the

object of preparing an inundation on the north and north-west fronts, are completed. An inundation, completely satisfactory from a military point of view, can now be created at short notice extending from Fresund up to the western part of the Utterslevmoor. This inundation is strengthened: partly on the right flank by the disposition of the Christiansholm battery, with the polygonal front appertaining to it, partly by four smaller flanking batteries lying behind the inundation, of which the two in Ordrupskrat are casemated, whereas the two batteries before Gjentofte, each have four 9 c.m. guns, are provided with bomb-proof magazines, and have guns on the open rampart.

The two batteries at Thinghoi and Vangede, which cover the centre of the position, are finished, and were very shortly to be provided with the armour-protected quick-firing guns destined for them.

2nd. Works continued.—The fort of Garderhoi, commenced in 1886, was so far proceeded with that the whole of the casemate buildings were ready. Early in the spring of 1889, the armament, which is to be composed exclusively of armour-protected guns, was to be commenced by the fixing of a Gruson tower for two long 15 c.m. guns. It is estimated that in the course of the year the fort will be sufficiently completed to receive its entire armament, as soon as it has been decided what this shall consist of.

The fort of Gammelmoorgaard, begun in 1887, had its glacis laid out, the necessary excavations prepared for the most important casemate buildings, and the works of drainage and communication completed. By the end of the year the earthworks will be practically finished, and the masonry work can be proceeded with.

3rd. New Works.—These may be arranged in two groups: one includes works undertaken on the north and north-west fronts for the elaboration of the system of works already in existence. The other comprises entirely new works on the west front.

The former includes the construction of a new provisional battery on the Thinghoi plateau. The armament of this battery is to be four heavy and two light fortress guns mounted on the open rampart; and it is to be furnished with a bomb-proof magazine. The works were so far advanced by the close of 1888 that the masonry was completed, and the whole battery should have been finished during the spring of 1889. The battery is in conformity with the adjoining batteries of Thinghoi and Vangede in being furnished with a broad, shallow, planted ditch.

The Christiansholms battery also, the work on which was stopped provisionally in the summer of 1888, is now to be prepared, and armed with three short 15 c.m. guns with armoured carriages on Schumann's system. The foundations for these were to be ready in the spring of 1889. Besides these three guns, it is to be furnished with two 47 m.m. quick-firing guns, the whole being protected with armour. Quick-firing and machine guns with armoured protection are also to be provided for the batteries of Thinghoi and Vangede.

The new works on the west front consist in a connected enceinte from the west side of Utterslevmoor to Kjøge Bay. With this work will be completed the undertaking having for its object to provide Copenhagen with a connected protection against an attack from the Seeland side. The enceinte has a length of 14 kilometres, and consists of 23 fronts, of which 9 are to be on the polygonal system, and the 14 others on the Danish system. The character of the latter fronts is the result of a remodelling continued during many years, of a front construction suited to the Danish conditions, and by which is secured a complete polygonal flanking by means of bomb-proof caponiers in combination with a flanking defence from the rampart, as in the bastion fortification. A wet ditch, 20 metres broad, constitutes the

passive defence, and is exposed to a powerful and complete flanking fire, provided for as indicated above.

The works which could not be seriously commenced earlier than July, 1888, were pushed on with the greatest energy. Unless their progress should be interrupted, it is estimated that they should be finished by the autumn of 1889. The extent of the undertaking can be judged of by the amount of earth to be dealt with, viz., $2\frac{1}{2}$ million square metres.

Egypt.

The total strength is given as follows :—

471 Officers, of whom 54 are British, 417 natives.
518 officials.
8,642 non-commissioned officers and men.

The British Officers were distributed in the following manner :—

24 belong to the several battalions, &c.
4 form the staff on the frontier.
3 form the staff at Suakin.
8 belong to the Medical Service.
15 occupy special positions as head of departments or in the Ministry of War.

Exclusive of the staffs, the Egyptian Army was composed as follows :—

	Officers.	Men.
11 battalions of infantry (4 black, 7 Fellah battalions)	204	6,897
6 batteries of artillery... ..	26	606
$2\frac{1}{2}$ squadrons of cavalry	19	465
2 camel corps.....	8	196
Total (24 British, 233 native Officers)....	257	8,164

These, together with the increase of 2,080 men recommended by the Sirdar, would place the total strength at 10,244 combattants.

France.

The Army budget for 1889 shows an increase of 15 millions of francs for the ordinary expenditure over 1888.

The sums placed at the disposal of the War Minister, as extraordinary credits, for the purpose of obtaining war material of all kinds, for the construction of new works and for strengthening of works previously in existence, reached a sum of over 770 millions of francs. Already more than $2\frac{1}{4}$ milliards had been devoted to the same objects; but the end of this extraordinary expenditure seems as far off as ever.

During the course of 1888 the peace strength of the army was increased, both by the creation of new formations and by the increase of the effective strength of these units. The new formations amounted to 1 cavalry regiment, 24 rifle companies, 12 companies of Algerian light infantry, and 16 batteries. By an alteration in the organization of the infantry regiments, 145 new battalions were added to the Territorial Army.

The increase of the rifle companies was introduced by a law dated the 24th December, 1888, which provided that all the rifle battalions should, in due course, be increased from 4 to 6 companies, according as might be

required by the exigencies of service and as money was available. In the meantime, the 12 battalions belonging to the 14th and 15th army corps districts, specially destined for operations in a mountainous country, were to be raised to the increased strength forthwith.

The actual increase in effectives over the existing establishments was as follows :—

- 1 to the battalion staff.
- 1 Lieutenant, to be in charge of the vehicles and mules.
- 1 sergeant }
- 1 corporal } to look after these.
- 1 corporal as shoeing-smith.
- 1 corporal as sick attendant.
- 3 privates as artificers and clerks.
- 7 to lead mules and driver.
- 2 draught horses.
- 8 mules (2 to each company).
- 1 Lieutenant or Sub-Lieutenant.
- 17 privates.
- 8 mules.

A law dated the 28th December, 1888, provided for the alteration in the artillery. The 12 new mountain batteries to be raised were to be attached, 6 to the divisional artillery regiment of the 14th artillery brigade, and 6 to that of the 15th brigade.

The strength of these batteries was fixed at the following :—

Establishment of a Mountain Battery.

- 1 Captain with 2 horses.
- 1 1st Lieutenant with 1 horse.
- 2 2nd Lieutenants or Sub-Lieutenants with 2 horses.
- 1 Adjutant with 1 horse.
- 1 maréchaux des logis chef with 1 horse.
- 1 fourier with 1 horse.
- 7 bombardiers.
- 1 bombardier as 1st shoeing-smith.
- 5 fire-workers.
- 4 carpenters and smiths.
- 2 assistant shoeing-smiths.
- 2 saddlers.
- 2 trumpeters.
- 122 gunners with 26 draught horses and 60 mules.

Total strength of the battery 160 Officers and men, with 34 horses and 60 mules.

Another law of the same date as that last referred to dealt with the subordination in time of war of the entire railway system to military authority.

The Minister of War makes the dispositions respecting all the lines lying within the country which are not situated within the sphere of operations. This control passes to the Commanders of the several armies in the case of those lines that lie within the sphere of operations. The Minister of War decides the time when this is to come into force in respect to each army and each line.

Amongst others the following are placed under the orders of the Generals commanding armies :—

1. Sections of railway workmen already organized and formed in time of peace by the railway companies and State lines.

2. Formation of railway troops.

The Administration of each line is to be represented at all times at the Ministry of War by an agent, who in peace time has, by the direction of the Minister, to make all the preparations for the transport of troops in war, and in war time to see that this is safely carried out. The Administration may further be called upon, even in peace, to attach an agent to the General who would in time of war command the army destined to operate in the district in which the line is situated. This official will have the same responsibility towards the General referred to as the agent previously mentioned has to the Minister.

A superior Military Railway Committee is to be formed already in time of peace.

On the motion of the War Minister, representatives of the Ministries of War, Marine, and Public Works, and of the large railway companies, are nominated by decree as members. Its sphere of action is to extend to the discussion of all matters concerning the employment of railways for war purposes.

In connection with the decree, regulations have been published regarding the following details (in the *Bulletin Officiel*, partie régl. No. 69) :—

1. Regarding the organization of the different branches which have to arrange for the transport ordered, and superintend its execution. At the head of each branch is an Officer and a technical agent of the railway company.

2. Regarding the organization of the railway workmen and their being called up in peace, the period of which is not to exceed 21 days.

3. Regarding the composition and sphere of action of the superior Military Railway Committee.

4. Regarding the organization and duty of the Etappen officials.

Recruiting.—The details of the number of recruits and their allotment to the several arms are to be found in the *Bulletin Officiel*, No. 43).

The total number of recruits, exclusive of non-effectives and those for the Navy, amounted to 152,228. The following were called up and assigned as noted :—

From the 1887 Class, 133,999, of whom 128,999 1st portion.			
			5,000 2nd portion.
1886 (put back)	....	....	12,973 1st portion.
1885	..	....	4,009 ..
			1,247 2nd portion.

Reserve.—Half of each of the yearly classes, 1879 and 1881, were called up for drill.

During the autumn manœuvres, between the 20th August and the 16th September, only the reservists belonging to the 3rd and 16th Army Corps were called out. Those of the other army corps were only drilled for 13 days, during the month of October, which was a departure from the practice in previous years. The infantry, zouaves, rifles, fortress artillery, and engineers (only those employed with the railway companies), as well as the non-commissioned officers of the infantry reserve detailed as drivers of the small-arm ammunition wagons in war, were up from the 1st to the 13th of October. The drivers referred to received their training with the Field Artillery. The rest of the Engineer reservists were up from the 3rd to the 15th October. Those of the Field Artillery were up in two series, each of 13 days' duration.

The untrained reservists of all arms indifferently were up for four weeks' training, from the 1st to the 28th October. The only exception was in the case of the cavalry reservists, of whom only those were called up who would be turned over to the Field Artillery in the event of mobilization. All those men who had not served actively before their transfer to the reserve were regarded as untrained. The calling up of the reservists took place by means of public proclamation.

In the course of the year the reservists of the Train and of the Administrative services were called up for different periods, each of four weeks, by means of notices personally addressed.

During the period between the 1st July and the 31st December the several yearly classes still under obligation to serve were distributed in the following manner :—

With the active army.....	the classes from 1887 to 1883
„ reserve to the active army	„ „ 1882 to 1879
„ territorial army	„ „ 1878 to 1874
„ reserve to the territorial army....	„ „ 1873 to 1868

Remounts.—For 1889 the number of horses was fixed at 111,664 (exclusive of those belonging to the gendarmerie).

Of these, 13,543 were Officers' horses ; 784 for the schools, and 97,335 troop horses ; being 4,838 more than in 1888.

14,148 remounts were to be bought ; the prices were fixed at the following rates :—

	Officers' horses. francs.	Troop horses. francs.
Horses for cuirassier regiments	1,400	1,160
„ dragoon regiments, the general staff, artillery and train	1,260	1,036
„ light cavalry.....	1,140	910
„ infantry.....	1,000	—

The total sum taken in the Estimates for 1889 on account of remounts was 14,370,520 francs, being an increase of $1\frac{1}{4}$ million francs over that for 1888.

The Remount dépôts at Angers, Mérignac, Arles, and Favernay were converted into dépôts de transition, and attached to the Remount dépôts at Fontenay, Agen, Macon, and Villers. The buying committees previously existing at the first-named dépôts were done away with.

War Matériel.—The provision of a large number of new field, fortress, coast, and siege guns is contemplated for 1889 ; about 180 millions were taken in the Estimates for extraordinary expenditure.

The following leading principles for guidance in the construction and armament of fortifications are stated to have been laid down by the superior Council of War :—

1. The detached forts and small independent works are to be provided with all the means made available by the present state of technical science for offering the most obstinate resistance ; for with them the fortified works themselves, and not their garrison, will form the main point of the defence.

2. Less money is to be spent over the larger works than hitherto ; for their chief strength lies in the action of large garrisons, in the extensive development of the fronts of fire, and in the skilful utilization of the ground.

3. To abandon a number of the smaller fortresses.

The Engineer Committee have further determined upon the type of

armoured towers, and how these can be adapted to the fortresses and detached forts.

In the course of the year continuous alterations were made in the fortresses and forts, and were directed chiefly to the restoration of the covering of the bomb-proof shelters, and to placing new armour, in view of the increased powers for destruction of siege artillery.

Layers of "beton" were used for the bomb-proof covering (*L'Avenir militaire*, No. 1286, 1314, 1316, 1320). A short description of the French fortresses, with four maps, is to be found in the *Guide-poche de nos forts et places fortes*, Paris, 1888. Lévy et Cie.

A further completion of the frontier fortifications is contemplated by the construction of new works and the strengthening of existing ones. For this purpose the following sums are provided in the budget for 1889:—

	francs.
For the fortifications of the eastern frontier	62,533,000
" " " south-eastern frontier	168,000,000
" " " northern frontier.....	5,000,000

A further sum of 25 millions was asked for by the Minister of War for the construction of forts, intermediate works, and railways at Paris. The Budget Committee did not report in favour of this expenditure, on the grounds that the sum was too small for the purposes for which it was required, and added their opinion that there was no pressing necessity at the moment for the construction of new works. The Minister of War stated that he would be under the necessity of renewing the demand later on.

Means of Communication.—The entire railway system, which at the end of 1878 comprised 23,401 kilometres, amounted at the end of 1887 to 34,210 kilometres, showing an increase of 11,000 kilometres in the 9 years, an increase in excess of that constructed by any other state. Strategic considerations have regulated principally the construction of the new lines. Regulations have been published for the instruction of the railway regiment, the formation of which was planned in 1888, but not carried out. The instruction is divided into two parts, the one dealing with the military, the other with the technical instruction. The former is to be conducted under the regulations for infantry as far as company drill; battalion formation is only to be adopted on parade. The technical instruction is to be carried out by the railway schools attached to the regiment, and by means of practical exercises. The Colonel of the regiment superintends, and is the head of the school; a battalion commander of the engineers acts as director, and the necessary teaching staff and civil instructors are attached. The curriculum comprises the French language, mathematics, physical sciences, geography, history, engineering duties, and the construction and working of railways.

The practical exercises take place in the first instances by companies, later by battalions, and then by the entire regiment. They extend over all the duties required to be performed by railway troops in war. A number of Officers and men are trained in the duties of working the line, of the workshops, and of telegraphy, as well as in driving locomotives. On the Government line, between Orléans and Chartres, two small detachments of railway troops have been employed since the spring. Each detachment consists of 1 Captain, 2 Lieutenants, 11 non-commissioned officers, and 48 corporals and privates. One detachment provides, in combination with the civilian officials, for the work at six stations and on the trains; the other is only there for the purpose of being instructed. The Lieutenants act as station-masters: the non-commissioned officers as assistants and telegraphists; the corporals as engine drivers, and the privates as guards, stokers, pointsmen, &c.

Military Telegraphs. By a decree of the 10th November, 1888, amending that of the 23rd July, 1884, regarding the organization of military telegraphs, the whole of the personnel of this service is to be employed in time of war with the army in the Directions, the sections of the 1st and 2nd lines, the telegraph park, and in the territorial service. The Minister of War decides on the places at which the several formations are to be mobilized, and the day when the mobilization must be completed. From the commencement of this, the officials and agents of military telegraphy form an integral portion of the army, and are subject to its laws and regulations. They enjoy according to their rank all the rights, honours and distinctions accorded to persons in the territorial army. A General, to be nominated by the Minister of War, is charged with the inspection annually of all branches of the military telegraph service.

The departments of War and Finance make the necessary arrangements for furnishing and keeping up the matériel.

The chief of the staff and the telegraph official attached to the general command for this purpose, in each region, are to make the necessary arrangements in time of peace for the rapid mobilization of the directions, parks, and sections, as well as for the organization of the territorial service.

Army Estimates.—The ordinary estimates for 1889 were fixed at 550,652,402 francs, being an increase of nearly 14 millions on the previous year.

As regards the extraordinary expenditure, the original scheme, which involved the spending of over $2\frac{1}{4}$ milliards of francs in replacing war matériel was completed at the end of 1887. But it did not follow that the extra expenditure was at an end; on the contrary, the demands made in 1888 for purposes of national defence amounted to another milliard. The greater portion of this, viz., 770,731,000 francs, were voted in December last by an overwhelming majority of the Chamber. Of this sum 228,335,000 francs have already been spent, 138,554,360 francs are allotted for 1889, and the rest is to be spread over the five following years.

The total establishments of the army for 1889 were fixed at 541,365 Officers and men. But as in this number 42,314 men are included and borne as temporary absent, the average effective strength would amount to 499,051 Officers and men.

Taking the higher number, the troops proper, including the departmental services, amount to 501,826 Officers and men, distributed as follows:—

	Officers.	Men, all ranks.
Infantry	10,899	304,521
Cavalry	3,273	71,270
Artillery	2,518	70,586
Engineers	388	10,581
Train	396	11,400
Administrative branches	—	16,043

As compared with the establishments in 1888, those for 1889 show an increase of 16,369 men and 4,838 horses, and a decrease of 579 Officers (530 infantry and 49 gendarmerie) and 136 gendarmes.

Ministry of War.—By a decree dated the 12th May, 1888, the Superior Council of War was reorganized for the fifth time since its establishment in 1872. At the same time the Committee of Defence was dissolved, on the grounds that as the new fortifications had been executed, it was no longer required. As formerly organized, the Council of War was only assembled at the pleasure of the War Minister, and often for a year at a time it was never

called together. In future the War Minister must assemble it at least once a month to discuss questions connected with defence, mobilization, the construction of strategic lines of railway, the general organization of the army, and the armament and defence of the coasts. The Council consists of 12 members, of whom four belong to it by reason of the positions they fill, and eight are appointed by presidential decree. The former are the Minister of War, who acts also as president, the Chief of the General Staff, to whom the duties of reporter are entrusted, and the presidents of the Artillery and Engineer Committees. The President of the Republic is empowered to call the Council together and take the Chair, in which case the Minister president and the Minister of Marine attend. The sub-chief of the General Staff charged with the work concerning military operations acts as Secretary. Besides these, the Directors of Sections at the War Department attend when the subjects to be discussed are connected with the branches for which they are responsible. In the event of questions as to the construction or abandonment of fortified places, or coast defences, having to be decided, the General Commanding the region affected, the Inspectors General of Artillery and Engineers or in the case of coast works, the Chief of the Staff to the Minister of Marine, the Inspector-General of the Marine Artillery, and the sea prefect of the arrondissement concerned.

The members appointed by decree were the Governor of Paris and seven divisional Generals. Of these latter it is believed four would in the event of war be appointed to the command of armies. To avoid these commands being assumed by Officers unacquainted with the state of the several army corps that would come under their orders, a decree of May, 1888, provides for their being informed by letters of service which army corps would form their respective armies. And though they cannot exercise command over these until their actual formation on mobilization, they are held responsible for the performance of very important duties in connection with them during peace. These are to look into everything connected with mobilization, war matériel, the distribution of the troops, the position of fortifications, and the means of transport, so far as they are connected with the sphere occupied by the several corps destined to compose the respective armies. These Generals are also to be employed in time of peace with special missions by order of the Minister of War, and to preside at conferences at which the corps commanders are assembled for the discussion of questions affecting several army corps. Special instructions issued by the Minister of War regulate in each individual case the relations between the corps commanders and the members of the Superior Council; the latter are to avoid any interference in internal arrangements, and they are to assume the control of the manœuvres of army corps operating in concert.

A new organization was also given to the consultative Committees. Their functions are to be limited to subjects of a purely technical nature, and not to be extended to those concerning administration, personnel, law, and strategy. The consultative Committees of the General Staff, of the several arms, of the sanitary service, and of the Intendance are to be termed Technical Committees, and are to limit their discussions to the questions referred to them by the Minister of War, concerning organization and training, and the changes to be made in these. The number of members of such a Committee is to be nine, of which seven must belong to the arm or branch of the service concerned. The Minister of War nominates the presidents, for the period of one year, and the members, who must belong to the troops stationed within the area of the Military Government of Paris or the neighbouring regions.

Re-armament of the Infantry.—During 1888 nearly the whole of the infantry was provided with the new repeating rifle on the Lebel system. In November

as many as 2,200 of these rifles were turned out daily, of which 1,200 by the St. Etienne small-arm factory, 600 by that at Chatellerault, and 400 at Lille. The whole of the infantry belonging to the territorial army are to be furnished with it also during the present year.

Train des Equipages.—In the Manual for General Staff Officers it is laid down that on mobilization each squadron of the train forms three new companies, which take the numbers 2, 4, and 6. The six companies are then formed into nineteen detachments. The 1st and 3rd companies, attached to the two infantry divisions, furnish three detachments, each for the horsing of the field post and treasury wagons, the ambulance wagons, and provision columns of the division. The 2nd company also furnishes three detachments for the ambulance wagons, and the first half of the corps provision column, and provides the personnel for the mobile remount dépôt.

The 4th company furnishes, in five detachments, the horses, &c., for the ambulance of the cavalry brigade, for the field post and treasury wagons of the army corps, the second half of the provision column of the army corps, the clothing column, and the telegraph section of the first line.

The 5th company forms four detachments: three for the ambulances and drivers for the mules; the fourth for the six field hospitals.

The 6th company only provides for the field bakery column; the remainder stays with the immobile army corps. The strength of the Train squadron of a mobile army corps has for its cadre 21 Officers, 80 non-commissioned officers, 92 corporals, 16 trumpeters.

Officering the Territorial Army.—During the year 1888 the number of Officers was materially increased, especially in the infantry. Over 900 new appointments were made in the rank of captain, partly by appointing retired captains, partly by the promotion of lieutenants; 700 sub-lieutenants were also appointed from those who had been one-year volunteers and non-commissioned officers. A number of superior Officers who had served in the Marines were also transferred to the Territorial Army. The increase was necessitated by the contemplated addition of a fourth battalion to territorial regiments. It is further contemplated to form fifth and sixth battalions in the event of war, to be called supplementary battalions.

Following the instructions of the 1st January, 1879, the Ersatz districts for the individual battalions of the infantry territorial regiments were assigned to the arrondissements and cantons within the sub-divisions (8) into which each region is divided (the 15th has 9). This arrangement has now been abandoned, and it has been ordered that the whole of the battalions of a regiment shall be recruited from the entire sub-division district, the troops belonging to the other arms throughout the region. No change has taken place in the points for mobilization.

It has been stated by the press that, in the event of mobilization only, the youngest class with the territorial army, viz., those 30 years of age, would be taken for the active army; that the 1st and 2nd battalions of territorial infantry regiments would be sent into the field, and be composed exclusively of men of from 31 to 34 years of age, and that the remaining battalions would be formed from the reserve of the territorial army.

One half of the whole number of the two classes 1876 and 1877 of the territorial army were called out for training during a period of thirteen days. The infantry were armed with the new magazine rifle, and two battalions took part in the national celebration of the 14th July.

Greece.

The strength of the Greek Army, as fixed for the estimates for 1888, was 26,340 men. It is divided between three General commands, the headquarters of which are stationed at Athens, Missolonghi, and Larissa.

The infantry consists of 10 line regiments of 3 battalions of 4 companies, 139 strong, and of 8 rifle battalions of 4 companies, 132 strong; but of these latter 6 of the battalions only are kept complete, the remaining 2 being only cadres.

Of cavalry there are 3 regiments of 4 squadrons, each 129 strong, with 101 horses. The artillery is composed of 3 regiments, of which the 1st and 2nd have each 4 mountain batteries; the 3rd 3 mountain batteries, 2 field and 1 mortar battery. Total 14 batteries each of 6 guns; the mountain batteries have a strength of 122, the field batteries of 132.

There is one regiment of Engineers of 2 battalions of 4 and 5 companies respectively, the 5th being a railway company; the strength of each company is 119.

There is one company only of Train, and a double company of the Sanitary service.

Universal service was introduced in 1887, the obligation lasting from the completion of the 21st to that of the 51st year.

This period is distributed as follows:—

In the Standing Army	2 years.
„ Reserve to the Army	8 „
„ Landwehr	8 „
(in the cavalry 10 years)	
„ Reserve to the Landwehr.....	10 „
(in the cavalry 8 years)	

The number of recruits to be enrolled each year is fixed by the War Ministry, and the required number chosen by lot. The remainder of the year's contingent go to the Ersatz Reserve, paying a fixed sum to free them from having to come up again the following year to take their chance for the active army.

The reserve to the army are to be called up for forty days' training during the 4th and 8th year of their service. The Ersatz reserve receive three months' training, and are during the rest of their term liable to be called up by the War Minister to supply the waste of the active army.

The law prescribes no drill for the Landwehr or its reserve. It lays down only that the former is to be called up in the event of war, the latter in case of invasion.

Italy.

The period of service in the active army is now uniformly fixed at three years, with the exception only of men in the cavalry, who serve four years. The year's contingent was fixed at 82,000 men for the army; but only 77,120 actually joined the colours. These were distributed 46,577 to the infantry, 6,438 to the cavalry, 12,879 to the artillery, 2,852 to the engineers.

The enrolment of volunteers was provided for as follows:—

One-Year Volunteers.—1. Each regiment to enrol 4 per company, squadron, or battery, to be counted in the establishment of the regiment.

2. Every military hospital Direction 4, of whom 1 to be an apothecary.

3. Every district having the headquarters of a General command 2 as Ersatz Officers for the commissariat or pay corps.

Ordinary Volunteers (for 1889).—Every regiment of infantry, bersaglieri, artillery, and cavalry 10; each engineer regiment 10; Alpine troops no limit.

Remounts.—On the 1st July, 1888, there were 8,014 horses on the remount depôts. Of this number 4,200 were bought last year in Italy as foals. During the year 3,000 horses had been supplied by the depôts. They now provide the whole of the cavalry, one-third of the artillery, and the Officers of all ranks

who are entitled to them. Owing to the division or doubling of the regiments of field artillery, a great number of horses have had to be purchased.

A new law for the requisition of horses provided that in case of war all quadrupeds (thus including mules) suited to military purposes may be taken at their estimated value. Those not actually taken remain at the disposition of the State. In each parish a list is drawn up of all the owners of horses or mules, and on the basis of these Committees are to be appointed annually to inspect and value the animals, and they are lettered according to the order in which they would be called up on mobilization. By a report made to the Chamber it appears that the first requirement, amounting to 120,000 horses, could be easily obtained, and the entire number required could be got in Italy alone.

Magazine Rifle.—The converted Vetterli rifle is still the arm in use ; and provision has been made for the further conversion of 350,000 rifles from the original pattern into magazine arms during 1889. Trials with an arm of reduced bore have been carried on notwithstanding.

The number of rounds carried by troops armed with the magazine rifle are as follows :—

6 packets of 8 cartridges in the havresack.....	48 rounds.	
3 " 8 " " pouch	24 "	
6 magazines of 4 cartridges in the pocket	24 "	
	—	
Total	96 "	

Troops armed with the single loader carry 8 rounds less.

Strength of Armed Forces.—On the 1st June, 1888, the following was the strength :—

Permanent Army—

Officers in active service, on half-pay, &c.	14,309
Ersatz Officers	4,110
Non-commissioned officers with the colours	16,215
on unlimited furlough.....	6,468
Corporals with the colours	42,774
on unlimited furlough	70,344
Privates with the colours	177,714
on unlimited furlough, 1st category	290,756
" " " 2nd " (trained).....	175,884
" " " 3rd " (untrained)...	616,479
	—
Total Permanent Army	1,405,053

Officers' horses	8,680
Troop horses	35,846
	—

Total..... 44,526

Mobile Militia—

Officers	533
Ersatz Officers	2,741
Non-commissioned officers	6,521
Corporals	30,519
Privates, 1st category	163,431
" 2nd " (trained).....	62,465
" 3rd " (untrained).....	122,636
	—
Total Mobile Militia	388,846

Territorial Militia—

Officers	5,512
Non-commissioned officers.....	11,677
Corporals	54,072
Trained privates	575,496
Untrained privates.....	695,982

Total Territorial Militia 1,342,739

Grand Total 3,136,638

(Of whom 1,435,097 untrained).

It is to be noted that all are returned as “trained” who have been called up for even short periods of drill.

Training of Reserves.

The infantry and bersaglieri of the 1st category of the yearly class 1860, were called up for 10 days, the Alpine troops for 23 days, 21,400 men. These took part in the manœuvres.

The 1st Category Class, 1862, of all arms, except cavalry, for 28 days. The Alpine troops with those of the 1860 class. The total number of these was 37,100, and they also took part in the manœuvres.

The 2nd Category Class, 1867, 17,400, men for 45 days; for such of them as had gone through a year's course with the National Rifle Association the period of instruction was reduced to 20 days. Including men of the mobile and territorial militias, the total number called up during 1888 for instruction was 131,000, showing an increase of a quarter over the number in 1887. For 1889 it will be still greater, in order that all the men not with the colours may be instructed with as little delay as possible in the use of the magazine rifle.

Reorganization of the Artillery.—The changes prescribed by the law of 1887, detailed in the Reports for that year, have been gradually carried out. The general inspection, inspections, and artillery commands contemplated by it were called into existence by a decree of the 7th June, 1888, which defined the scope of their respective jurisdictions and duties.

The Inspector-General is placed directly under the Minister of War; he superintends the technical service of the artillery, controls the studies and experiments relating to the artillery service, the matériel, the employment of the arm in war, and the armament of fortresses. He makes proposals of a general nature, *i.e.*, such as it is beyond his own sphere to decide. Under the orders of the Minister of War he inspects in all branches of his service.

The Inspectors have similar duties to perform within their several jurisdictions. Of the two Inspectors of field artillery one deals with the field artillery in the district occupied by the 1st to the 5th army corps, the horse artillery, and the mountain artillery regiments; the other deals with the field artillery of the 6th to the 12th army corps. They communicate with the Minister of War through the Inspector-General.

The Officers at the heads of the several artillery commands have the same authority and duties as the former artillery territorial commanders; that is, as a brigade commander in everything relating to discipline, duties, and training of artillery. Personally they are, together with their Officers, subordinated to the General commanding the district in which they are situated. For the rest they are directly responsible to the Minister of War, and communicate with him on all points concerning 1st, the technical and administrative part of the duties of the Territorial Directions and Artillery Establish-

ments; 2nd, the civilian official personnel with the regiments, Directions, and Establishments. The four field artillery commands are established in Milan, Piacenza, Bologna, and Rome, the two fortress artillery commands in Turin and Rome.

The doubling of the field artillery regiments was prepared for in 1887 by the creation of four new batteries per regiment, which then had 14 batteries each. On the 1st October, 1888, the light (7-cm.) batteries which had previously in peace 6 guns each were reduced to 4 guns. On the 31st October two new heavy (9-cm.) batteries were formed per regiment, and from the following day the separation of each of the regiments, now 16 batteries strong, into two regiments, took effect. Of the 24 regiments thus formed 12 are divisional artillery, and are armed exclusively with heavy guns. 12 are corps artillery, and have in each of their two brigades of 4 batteries two armed with light, and two with heavy guns. Whereas the peace strength hitherto of batteries having 4 guns, was 100 men, and 54 horses, the new batteries have only 90 men, and in the case of heavy batteries 45 horses, of light 42. On mobilization the batteries are all to be made up to 6 guns, in place of 8 as previously. The divisional artillery regiments have each one train company, the corps artillery regiments two companies. In war, besides the artillery brigade and regimental commanders, there is to be a commanding Officer of artillery with every infantry and cavalry division.

Creation of Engineer Inspections.—On the 1st July, 1888, a General Inspection and Inspections were created for the Engineers. On the same date the Artillery and Engineer Committee was dissolved.

The Inspector-General is directly under the Minister of War; he superintends the technical duties of the Engineers, and controls the studies, duties, and buildings connected with the Engineer service. He makes proposals regarding questions of a general nature, and he inspects all branches of the service under the orders of the Minister of War.

The Inspectors perform similar duties within their own spheres.

Mobile Militia Training.—The 1st Category of the infantry and bersaglieri of the Classes 1856, '57, and '58, belonging to 15 districts, amounting to 17,000 men, were called up for 10 days' drill. The Officers were up for 12 days. The men were formed into 21 battalions and 20 bersaglieri companies; the battalions were commanded by Officers of the line, the companies by Captains and Lieutenants, for the most part drawn from the active army. The result of the training was regarded as satisfactory; but the Officers belonging to the Mobile Militia, for the most part taken from one-year volunteers, left much to be desired as regards their efficiency.

Organization.—The new organization prescribed in 1877 was detailed in the Reports for that year. The following modifications have been made in giving effect to it:—

- There are now 48 infantry regiments (in place of 44).
- 12 brigades of field artillery (in place of 13).
- 13 train companies (in place of 14).
- 34 fortress artillery companies (in place of 36).

The several units of the Mobile Militia have the same strength and composition as those corresponding to them in the permanent army, except that they do not have bands. In the reorganization an approach has been made to the territorial system by allocating the regiments to districts.

Territorial Militia Training.—The 1st and 2nd Categories of the infantry, Classes 1852, '53, '54, and '55, and the 3rd Category, Classes 1861 to 1866, of 23 parishes, in all about 15,000 men, were called up. They were formed in 31 battalions at the large garrisons, and drilled for 10 days, exclusively by

Officers of the Territorial Militia, with one exception. The period was pronounced too short for any solid results to be obtained, and the same insufficiency was observable in the efficiency of the Officers as was the case with the Mobile Militia. The 1st and 2nd Categories of the Artillery, Classes 1852, '53, and '54, of 21 districts, numbering about 3,000 men, were up for 15 days. The 3rd Category, Class 1867, about 18,000, for the same period. The Territorial Militia forms now an integral part of the army, and it is to be armed with the converted Vetterli rifle. The period of drill is fixed at 30 days every four years—which may be spread over these years.

Sanitary Service.—The “Red Cross” Society in Italy is organized under the Minister of War for services with the army, and can provide the following assistance :—

	Beds.
13 hospital trains with beds for 200 sick or wounded	2,600
4 hospitals with 200 beds	800
12 ,, 50 ,,	600
Total	4,000

To facilitate the work of the Society, the Minister of War has sanctioned the exemption from other service in peace and on mobilization of men belonging to the Territorial Militia, excepting those of the artillery, engineers, sanitary and supply services, who are enrolled as members of the Society.

Montenegro.

Since 1883 the Montenegrin forces have been composed of a standing army and the war levy. The dimensions of the former are very limited ; it consists of the guard 300 strong, a portion of which is mounted, and three garrison battalions 490 each ; total, 1,770 men. The war levy consists of 45 battalions, for which arms are available ; and 300 artillerymen trained by Russians, with 24 Krupp guns (7.5-cm.). The total strength is estimated variously at from 24,000 to 35,000 men capable of bearing and trained to arms from earliest youth.

Austria-Hungary.

The Army law of 1868 fixed the strength of the army, in the event of war, for a period of ten years. It was renewed for a like period with certain modifications in 1878, and consequently came on again last year for a further renewal. The occasion was taken advantage of to introduce material alterations, which were met with considerable opposition in the Chambers at Vienna and Pesth, as well as in the country generally. The original basis on which the number of the annual contingent of recruits was that they should be sufficient to secure to the State an armed force of 800,000 men (including navy) in first line ; this number was 95,474. The object aimed at has been so far satisfied by this arrangement that on paper the 800,000 have been fully maintained. But it has been alleged, very truly, that a paper strength is not the effective strength, and that to deduce this from it, 8 per cent. must be deducted, in this case 64,000. To obtain, therefore, an effective strength of 800,000, the paper strength must certainly not be less than 864,000, to maintain which necessitates the yearly contingent being increased to 103,100 ; and this is provided for by the new law.

A further increase is made in the case of the Ersatz Reserve, which in the army as well as in both Landwehrs is fixed at 20 per cent. of the annual contingent. In accordance with this the number of recruits to be annually enrolled for the several branches of the armed forces is as follows :—

	Men.
For the Army	103,100
„ Ersatz reserve to the Army	20,620
„ Austrian Landwehr	12,000
„ Ersatz reserve to Landwehr.....	2,400
„ Hungarian Landwehr	12,500
„ Ersatz reserve to the Hungarian Landwehr	2,500
	<hr/>
Total.....	153,120

These numbers are calculated to provide not only for a field army of 1,200,000 men, but further for maintaining it, during a war of long duration, at that strength by means of the Ersatz reservists.

A material point in the new law is the alteration in the age at which those drawn to serve in the active army come up, from 20 to 21 years of age. The necessity for this was stated to be the defective growth and stamina of the recruits called up from some portions of the Austrian dominions. The obligations to service now, therefore, begins with the 1st January in that year in which the 21st year of age is completed. The term of service is 3 years with the colours, and 7 years in the reserve to the active army, 10 years in the Ersatz Reserve, 2 years in the Landwehr and its Ersatz Reserve, and lastly in the Landsturm up to the completion of the 42nd year. Those who are enrolled direct in the Landwehr without previously having served in the regular army or Ersatz Reserve belong to it and its reserve for 12 years. The obligation to serve in the Landsturm in the case of Officers unemployed or who have left the army, lasts until the age of 60.

An important addition has been made to the regulations regarding one-year volunteers. It is upon this class that the reserves are in great part dependent for Officers in the lower ranks. On the conclusion of the twelve months' service every one-year volunteer has to present himself for examination, with a view to qualifying for appointment as an Officer of reserve. But it was found that these young men placed no particular value upon qualifying for the position, and a large proportion failed to do so. In order to put a stop to this unsatisfactory state of things, a new regulation has been adopted by which those one-year volunteers who fail to pass the examination at the end of their term of service will render themselves liable to serve for a second year.

War Matériel.—By the end of February, 1889, the small-arm factory at Steyrer had turned out 230,000 of the new small-bore (8 m.m.) magazine rifle, and gave a daily output of 860. As many as fourteen infantry divisions had been armed with the new pattern and furnished with the new ammunition for it, and also for the most part with the new pattern two-wheeled company ammunition carts. The infantry regiments and rifle battalions which had been armed with the new rifle had the whole of their reservists up for a special 7 days' drill, for the purpose of exercising them in the use of the magazine arm. With a view to improving the shooting of the army, so as to ensure the best possible result from the use of the magazine rifle in war, the allowance of ammunition for target practice was raised in the infantry from 110 to 150 rounds per man, which is the number previously allowed in rifle regiments.

The introduction of a fuze that will burn for an increased length of time has the double advantage, that the field artillery will have an increased range for shrapnel fire, and be able to employ indirect fire to a greater extent.

In the entrenched camp of Przemyśl several provisional works were strengthened, some converted into permanent ones and armed anew. In the fortress of Cracow a large artillery arsenal was commenced, and in the

Southern Tyrol the reconstruction of existing and the creation of new works, commenced the preceding year, were continued. The land defences of Pola, commenced in 1887, will be completed in 1889.

Communications.—In the course of 1888 several branches, the construction of which was recommended by the railway section of the General Staff, in connection with the important strategic line Kaschau-Oderberger, were undertaken. The single lines on the Czerencs-Legenye Mihály line of the Hungarian North-Eastern Railway, and on the Legenye Mihály-Mező Laborcz line of the Hungarian-Gallician line, were doubled. This was also done on the Hatvan-Miskolcz-Czerencs line of the Hungarian State Railway. In Hungary also a new main line was laid from Sunja to New-Gradiska 77·8 kilometres in length, and a line, Vlarapaso-Tepla-Trencsin-Teplitz (46·5), besides several minor and local lines.

Modifications in Organization.—The peace establishments for 1889 was fixed at 18,960 Officers, 276,400 other ranks, and 51,460 horses.

With the object of ensuring a more rapid and effective mobilization, several modifications, some of considerable importance, have been introduced into the previously existing organization, these are to the following effect:—

1st. The creation during peace of certain formations previously postponed until the period of mobilization. Such were the creation of five heavy battery divisions on a reduced peace establishment and of three train squadrons for five and three Landwehr divisions respectively; the formation of the staffs for the three most important cavalry division commands; and the establishment of a telegraph Ersatz cadre to the railway and telegraph regiment.

2nd. The strengthening of the existing formations, which were considered too weak for the requirements of a mobilization. Thus the number of senior Officers was increased with the infantry, rifles, railway, train, and sanitary troops, so as to have an Officer available to command the new formations to be called into existence on mobilization. An increase in the strength of eight railway companies.

A further increase to the army has been effected by making supernumerary 640 Officers and 1,500 non-commissioned Officers and soldiers detached to schools and offices from the troops. The total increase for the year amounts to 1,341 Officers, 3,136 men, and 407 men, without including 2,050 men and the same number of horses of the cavalry kept supernumerary to the ordinary establishments, with a view to meeting the increased requirements of the cavalry on mobilization through the formation of staff detachments.

Siege Batteries.—At the close of the manœuvres in 1888, a provisional organization was introduced by the formation of a group of mobile siege batteries to be a mean between field and fortress artillery. The guns of the field artillery are often too light to carry out effectively the attack against hasty field entrenchments. The heavy guns of the siege train are not easily made available against hastily constructed works, and they are not required for the purpose. Guns of position of 12 cm. calibre and 15 cm. mortars are amply sufficient, and are more easily moved. So as to have them available with the various columns operating at a distance from the siege park of an operating army, they are to be organized in groups and rendered mobile. A trial with this object was made at the Vienna arsenal by the formation of one battery of guns and two of mortars into a "Group of siege batteries." The gun battery was composed of four 12-cm. short steel-bronze guns, the mortar batteries each of four 15-cm. steel-bronze siege mortars. The group, therefore, comprised 12 guns, with 82 wagons, 534 men, and 409 horses. The experiments carried out gave very satisfactory results, and it was decided to make these groups a permanent formation for the artillery. Five groups are to be formed: two in Vienna, and one each for Budapest, Cracow, and Przemyśl. They will be separated entirely from the siege park, and attached

to the operating armies, where they will be placed directly under the army, army corps, or divisional-commander.

Russia.

The law regarding universal service of 1874 received an important alteration by a decree of the 26th June, 1888, which was stated by the Russian press to be intended to meet the new provisions of the German Army law.

Obligation to service begins with the 21st year of age. The recruits are selected in the autumn of the year in which they complete their 20th year. The duration of service in the standing army is 18 years, of which 5 years with the colours and 13 in the reserve. The period with the colours is shortened in the case of the educated classes according to a scale which varies with the standard of education, and is different according as the individuals have been raised, in the ordinary manner, by lot, or are volunteers. This is shown by the following table :—

			With the colours.	In the reserve.
<i>Men Raised by Lot.</i>				
1st standard of education	Leaving certificates from the		2	16
2nd " "	several educational estab-		3	15
3rd " "	lishments		4	14
<i>Volunteers.</i>				
1st standard of education	{ Certificates from educational establishments of the 1st and 2nd classes		1	12
2nd " "	.. Special examination.....		2	12

In the case of the populations beyond the Caucasus and of the foreign populations of the Kuban and Terek territories, the service is 3 years with the colours and 15 in the reserve.

The reservists are obliged to attend two trainings, each of six weeks duration.

The Reichswehr consists of the entire population capable of bearing arms who do not belong to the standing army, from their 21st year till they complete 43 years. They are divided into two levies. The first levy serves to complete and strengthen the standing army as well as to form Reichswehr formations, and includes men belonging to the following categories until the completion of their 43rd year :—

1st. Those who have completed their army service.

2nd. Those who are liable but are not taken for the regular army, provided they are fit for active service and are not the only support of their families. The four youngest yearly classes are under military control, and can be called up for two trainings of six weeks' duration.

The second levy serves exclusively to form the units of the Reichswehr troops, and is composed of those individuals who have been exempted from

service in peace time on account of their being the only support of their families, and of those who have not been found fitted for active service.

Certain classes of professional men are given great concessions in regard to the obligation to serve. Those in holy orders belonging to any Christian persuasion, and the trained psalm-readers of the orthodox faith at the clerical academies, &c., are entirely exempted. Doctors, veterinary surgeons, apothecaries, teachers, artists trained abroad at the expense of the state, can only claim exemption during peace.

Claims on account of family, property, and civil education are taken into consideration, exemption during peace being granted or temporary postponement of service, according to the circumstances.

The changes made in the new law, particularly those which have for their effect to shorten the service with the colours and to lengthen that with both the reserve and the Reichswehr, should be of great advantage from the military point of view. If, as is alleged, the machinery for thoroughly training the men in the shorter period (virtually four instead of five years for the majority) is in existence, the gain is evident, and will also be a great boon to the people. By prolonging the length of service in the reserve by three years, the number of trained men available for the field armies will be increased by about 637,500 men. Of more importance than the prolongation of the obligation to serve in the Reichswehr from the age of 40 to that of 43, is the provision that the four youngest yearly classes belonging to it shall be subject to military control. Though not in name, this virtually provides a valuable Ersatz reserve, previously wanting in the Russian organization.

Establishment of Pigeon Posts.—As an experiment, military pigeon posts are to be tried for a period of three years, under the control of the Engineer Department. Their object is to maintain communication with the fortresses in the event of investment. The post-stations are divided into four classes, according to the number of directions in which communication has to be maintained; 250 pigeons is the number allotted to each line. The 1st class stations are under a Lieutenant-Colonel, the rest under other Officers. Those situated in fortresses are subordinate to the commandants, others to the chiefs of the military district staffs. A special breeding depôt is to be established at Brest-Litovsk. The stations at which the experiment is to be made are stated to be the following:—

Brest-Litovsk, 1st class

Line to Novogeorgievsk.....	200	versts	} 1,000 pigeons.
„ Warsaw.....	170	„	
„ Ivangorod.....	130	„	
„ Luninez (near Pinsk) 200	„	„	

Warsaw, 2nd class—

Line to Novogeorgievsk.....	25	versts	} 750 pigeons.
„ Brest-Litovsk.....	170	„	
„ Ivangorod.....	85	„	

Novogeorgievsk, 3rd class—

Line to Brest-Litovsk.....	200	versts	} 500 pigeons.
„ Warsaw.....	25	„	

Ivangorod, 3rd class—

Line to Brest-Litovsk.....	130	versts	} 500 pigeons.
„ Warsaw.....	85	„	

Luninez, 4th class—

Line to Brest Litovsk.....	200	versts—250 pigeons.
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Communications.—The lines opened for traffic in 1888 were the following :—

Trans-Caspian as far as Samarcand.
 Romny—Krementschug.
 Samara—Ufa.
 Rshéf—Vjasma.
 Jassinowataja—Kalmius (Donez-Becken).
 Samara—Volga bank.

The following lines are in course of construction :—

Kasatin—Uman—Schpola.
 Wapnjarka to a station on the line Kasatin—Uman.
 Riga—Valk—Pskoa.
 Valk—Dorpat.
 Ufa—Slatoust.

A new arrangement has been approved of for goods wagons to facilitate their employment for the transport of troops. It allows of their being disposed in two tiers, and has the advantage of giving room for them to lie down at night.

Infantry-Reserve-Battalion Cadres.—These cadre formations have received an increase in the number of their officers, and three battalions have been expanded into regiments of two battalions each. This in itself is of no great importance ; but if, as has been rumoured, this expansion were to be extended to the reserve battalions generally, it would mean an increase to the army of 116 battalions.

Increase of Rifle Battalions.—The twenty single rifle battalions that existed previously have been converted into twenty rifle regiments of two battalions each. It is stated that a further development is contemplated, by which a 3rd and 4th battalion would be added, and that eventually separate brigades will be formed from these troops.

Train.—At last a special formation of train troops has been adopted by Russia. Five train cadre battalions have been formed, of which No. 3 has two companies and the rest four. The companies are divided into 5 subdivisions, and are numbered throughout from 1 to 18. Each subdivision serves as the basis of a war transport. The establishment of a battalion of four companies in peace is 15 Officers, &c., 399 men, 40 two-wheeled carts with 80 horses. Each battalion has on charge the necessary vehicles, harness, and equipment for the expanded formations in war.

On mobilization each company is expanded to form a war battalion (Nos. 1 to 18), each furnishing 5 war transports (90). The commanders in peace of the battalions become heads of the army transport, the company commanders are appointed to command the war battalions. Each wagon transport is divided into two subdivisions of four sections, with a total of 183 two-wheeled carts. The amount of provisions to be ordinarily carried by each of these wagon transports consists of a four days' supply of biscuit and groats, and an eight to ten days' supply of salt, or tea and sugar for 10,000 men, as well as a three days' supply of oats for 1,600 horses. The requirements of the transport column itself is also provided for.

Supply of Ammunition.—Flying artillery parks are attached to the divisions of the mobilized army in the following proportion : 4 (two with S.A., two with gun ammunition) to each infantry division.

Those for S.A. ammunition carry 413,568 rounds and 2,880 revolver cartridges.

Those for gun ammunition contain :—

492 shell,	540 shrapnel,	and 48 case	for heavy guns.
912 „	960 „	48 „	light „

Movable artillery parks are attached—2 to each reserve division of the 1st category ; 1 to each of the 2nd category, and 1 each army corps. One of these parks contains, if for S.A. ammunition, 343,296 rounds and 5,760 revolver cartridges ; if for gun ammunition :—

246 shells,	270 shrapnel,	24 case	for heavy guns.
608 „	640 „	32 „	light „

The total number of rounds available per rifle is 196·8 distributed as follows : on the soldier's person in the pouches and pack, 84 ; in the S.A.A. carts, 48 ; in the flying artillery parks, 53·3 ; in the movable parks, 11·5. The number of rounds carried per heavy gun of the army corps is 259·5, viz., 117·2 shells, 129·6 shrapnel and 12·7 case, and per light gun, 268·2, viz., 126·4 shells, 133·9 shrapnel, and 7·9 case.

Local parks would be formed according to circumstances, in addition to the mobile ones referred to above.

Training of the Troops.—Apart from the ordinary exercises by units and manœuvres by mixed bodies of troops, the employment of the several arms in exercises of a special nature is of interest, as showing the earnest desire to train the soldier in a practical manner for war. Such are, for infantry, the practice of night attacks, the attack and defence of entrenched positions, and the “penetrating attack,” in which the troops launched to the attack are not permitted to halt until they have penetrated the enemy's ranks. The greatest attention continues to be given to an improved rifle instruction. With the cavalry, distance rides, and swimming rivers continue to be practised, and with this arm also “penetrating attacks” against firing infantry and guns. The artillery have been practised as in 1887 in firing on bivouacs, and in one of these practises the limbers were left behind and the ammunition brought along on the horses of the detachment.

Training of Reserve.—The number called up was 128,379, belonging to the infantry, field and fortress artillery of European Russia and the Caucasus ; the duration of the training was from 21 to 26 days. The classes called up were those of 1883, whose service with the colours had been shortened, and those of 1878, who had served from 3 to 5 years with the colours.

The most important part of the reserve exercises was the trial mobilization of the 31st reserve infantry division and the 51st reserve artillery brigade. For this purpose four companies of the reserve infantry battalions, Nos. 54, 61, 67, 68, and the third battery of the 4th reserve artillery brigade, were brought together, and from these were formed four regiments of four battalions and four batteries of eight guns, without horsed S.A.A. wagons. In order to complete these formations to a war strength, 49 Officers and 15,678 men were called up from the reserve for 26 days. As the number of reserve Officers was not sufficient, the requirement was completed by detached line Officers. The horses were obtained under the special law on the subject from the inhabitants of the district concerned. The men joined between the 21st and 25th August at the place of mobilization, and were placed under canvas till the 5th September, when the mobilized units were forwarded, fully equipped, by rail to the manœuvre ground. The result of the experiment was stated to have been most satisfactory, but it must be remembered that it was partial only in its nature, and it had long been known that it was to take place.

Turkey.

Recruiting.—The result in 1888 of the new recruiting law of 1886 was to furnish a contingent of 40,000 men (1st portion : 1st training class), which allowed of the two reserve classes, 1883, 1884, being sent down. Besides this number, about 23,000 men (1st portion : 2nd training class) were called up for training for a period extending from five to nine months. This training of the men belonging to the Tertib sani (2nd training class) is a clear gain to the armed forces of Turkey, and it is said to have given very satisfactory results. Not including these men, the peace strength of the army was about 185,000 men.

Defensive Works.—The new works on the Dardanelles, Yeni-Kali, and the island of Tenedos were frequently inspected by the President of the Engineer Department. Those situated on the island of Tenedos, at the entrance to the Dardanelles, were finished, and were shortly to receive their complete armament. A scheme was put forward for the construction of some works in the Vilajets of Salonika, Monastir, and Cossowo.

Armament.—During 1888 the final delivery under the contract concluded with Krupp in 1885 for field guns was made, and the Turkish artillery now has 1,000 of these guns (7.5 and 8.7-cm.). A further consignment of 12 coast guns, namely—2 of 35.5 cm. (80-ton guns) and 10 of 24 cm.—was delivered in February, 1889, together with a supply of ammunition for them.

Communications.—The most important point to be noticed is the granting of a concession to a German firm for the construction of a railway in Asia Minor, from Eski Scheir to Angora, a distance of 400 kilometres. As long ago as 1872 a scheme was worked out for the construction of a railway system in Asia Minor. The question has since been frequently discussed, and nine years ago the first step was taken towards carrying it out by the construction of the European portion, from Constantinople (Haidar Pacha) to Ismidt (92 kilometres). But no company with capital came forward to undertake the further portion of the scheme until 1888, when English, French, and Germans competed for the concession. A concession was also granted for a local line from Jaffa to Jerusalem.

The beginning now made will assuredly lead to the extension of railways throughout Asia Minor in due course, and while the importance of this from the commercial point of view should be considerable, it will undoubtedly be of much greater moment from the strategic standpoint. By the construction of a system of railways the rich recruiting ground offered by Asia Minor will be opened up, and it will become practicable to bring the whole resources of the Turkish Empire to bear on an European theatre of war.

Infantry Tactics.

In Germany the series of new regulations, having for their object to bring the instruction of the army up to the level of the latest developments in arms and in the tactics resulting from the introduction of them, was crowned by the publication, on the 1st September, 1888, of the new infantry drill book.¹

Comparisons between the new regulations and those they replaced have been published in many forms, as also in many languages. They show that the emendations and changes in the old regulations are very numerous, but beyond getting at this result the comparison is not of any great value. It will be sufficient to note here that the foundation on which the new regulations are based are, 1st, that the individual instruction of the recruits shall be

¹ For a summary of its contents see No. 148 of the Journal.

as thorough and complete as it is practicable to make it; and, 2ndly, that what is taught throughout shall be applicable to the battle-field. The enormous amount of experience gained during the war of 1870-71, the collation of which has become possible through the publication of numerous regimental histories, and the works of many able writers who took part in the campaign, has allowed of decisions being arrived at as to what formations and movements are absolutely impracticable under effective fire. All such have been either altogether omitted or reserved for use exclusively on formal parades, and the number so reserved has been reduced to a minimum. A reference to the summary already referred to in the note will show how completely this rule has been adhered to. The reasons for it are not far to seek. In the first place, with the shortened service, time is no longer available in which to teach men formations and movements which it is impracticable to use before the enemy without heavy losses being entailed. And, in the next place, experience shows that what soldiers have been taught in peace they will, in the excitement of the battle-field, naturally do; it is, therefore, of double importance to restrict the instruction to such points as will be required in war. One other very noticeable point is the absence from the new regulations of any normal formation for attack, and the absolute prohibition against any such being drawn up or practised.

In France, also, new regulations were issued for trial by the infantry, in May, 1888, but were found to be so impracticable that they were withdrawn. The spirit in which they were drawn up is evidenced by the fact that the five parts into which they were divided contained 766 pages, whereas the German Regulations contain 172.

The issue of new Musketry Regulations gave more satisfactory results. The number of rounds of ball ammunition to be fired yearly is, for the active army, 120; for reservists, 27; and for men of the territorial army, 20. The exercises are divided into individual firing, at which 88 rounds are fired at ranges up to 600 metres. The remainder, 32 rounds, are fired in six practices, in volleys, at 600, 800, and 1,000 metres; one practice being devoted to magazine volley firing (8 volleys in the minute); one practice at independent fire advancing from one position to another, from 600 to 500 metres; and one practice with rapid fire with the sight at 400 metres. In addition to this, 50 rounds are allotted to field firing, and are distributed as follows: two practices at unknown distances, under a non-commissioned officer; one practice in volley firing, under the commander of the sub-division; one practice as a company advancing to the attack from 800 to 200 metres; and one practice as a battalion advancing to the attack in the same way.

The 8th chapter, which deals with the rules for the control of fire, is the most important, and is based on the performances of the new Lebel magazine rifle. Fire control is carried out by units, which should not be larger than a half-company. The commanders of these regulate the beginning, the end, the interruption, and intensity of the fire, the object of which is to produce the greatest possible effect in the shortest possible time. Fire at long ranges seldom repays the expenditure of ammunition; when it is employed, a large number of rifles should be directed on the same object. The employment of fire is ruled by the consideration whether the engagement is of the nature of an attack, of a defensive action, or a rapid assault. In the attack, fire should be opened as late as possible, but then continued with the greatest possible energy and rapidity. As regards the application of the different kinds of fire, the battalion commander points out the object to be fired on, and, as far as possible, the portion of the enemy's line on which the fire is to be concentrated. The Captains regulate the application of the fire and the expenditure of ammunition, and point out the object if this has not been done by the battalion commander. Half-company commanders and non-commissioned

officers superintend the proper arrangement of the sights and the direction of the fire. Volleys are only to be fired by units not larger at the most than a half-company; rapid fire is only to be employed at decisive moments, and magazine fire only on the command of the Officers. The distances are divided into: short (up to 600 metres); medium (600 to 1,200 metres); long (over 1,200 metres). Individual fire is only to be employed up to 300 metres against skirmishers covered or lying down, to 450 metres against single horsemen, 600 metres against groups of four or more men. Concentrated fire is recommended against objects of the breadth of a group up to extended columns and lines from 800 to 2,000 metres, being dependent in a great degree upon conditions of weather. Officers and non-commissioned officers are at the medium and long distances to observe the effect of the fire, and regulate the sights accordingly; in exceptional cases, where opinions regarding the distance differ as much as 200 metres, the sights may be set at several distances. As regards the vulnerability of the several formations, it is stated that the company in line begins to feel the effect of fire at 1,800 metres; the half-company columns and company columns at 2,000 metres; men kneeling are almost as easy to hit as standing up.

The Italian infantry also received in 1888 new musketry regulations, as a result of the introduction of the magazine rifle. As in the cases of France and of Austria during the past year, this issue of the new arm has entailed a material increase in the quantity of ball ammunition allowed for practice.

Cavalry Tactics.

No material changes took place during 1888 in the views already generally accepted in regard to the manner of employing cavalry in war. In the matter of equipment, the days of the cuirass are at an end except as a parade dress; and its use has been discontinued by the German cavalry. The lance, which had fallen into disrepute, and been entirely set aside by some European armies, is coming into favour again, and it seems likely to be established in the high place it formerly held. The question of giving the cavalry a repeating carbine has been freely discussed; but in France alone it was decided to arm the cavalry regiments with one, namely with the Lebel repeating carbine (8 mm.).

In Germany increased importance was given to the use of the carbine by the publication of new Musketry Regulations for the Cavalry. In these it is pointed out that instruction in firing is one of the most important portions of the training of cavalry, and must be carried out in all its parts with the greatest care. Whereas formerly special prominence was given to the training of the cavalry soldier at short distances, it is now prescribed that he is to be equally carefully trained throughout the three classes, for it is at longer distances that fire will ordinarily be possible. In field firing the manner of delivering the fire is restricted to groups and subdivisions; individual firing finds no place. Firing by groups is employed principally at short distances up to 500 metres; by subdivisions at medium and long distances.

The practical value of a more thorough training of cavalry in the use of the carbine was evidenced by an advanced guard exercise carried out over the Hagenau practice ground. A squadron formed part of the body of mixed troops employed, and was utilized dismounted from time to time to direct carbine fire against targets representing an enemy. The results were not altogether satisfactory, and gave occasion for the General Commanding to point out that, though the employment of cavalry with their carbines dismounted would seldom occur, adequate training is indispensable if they are to avoid a check in such cases. The difficulties for the subdivision com-

manders in judging distances correctly in unknown and unexpected conditions, in quietly conducting the fire, and maintaining fire discipline, are clear; constant practice is, therefore, required.

In Russia, judging from the dispositions made for the manœuvres, the theory regarding the employment of masses of cavalry as mounted infantry appears to have continued to lose ground. Great stress was laid upon the importance of cavalry being employed in concert with, or in opposition to, infantry in every manœuvre in which infantry took part. Night manœuvres were practised, and it is thought in Russia that in future wars they will play an important part.

In France the tactical training of the cavalry is seriously interfered with by the number of recruits, due to the short periods of service (generally $3\frac{1}{2}$ to 4 years), and by a number of the remounts being unfit for the field. Including volunteers, each regiment has from 260 to 290 recruits each year; and, judging from the manœuvres, when the Divisions were about 1,900 horses short, the regiments are still worse off in the matter of horses. In these days, when training under service conditions is acknowledged to be of so much importance, French cavalry is placed by these circumstances in a very disadvantageous position as compared with the German.

Field Artillery Tactics.

The issue provisionally of new Drill Regulations¹ for the Prussian Field Artillery in the spring of 1888 will no doubt be followed by the adoption generally of new regulations, the necessity for which has arisen through the changed conditions under which the arm is now employed in the field.

The principal tactical question under discussion has been the bearing on the employment and importance of field artillery fire, of the introduction of magazine arms. In an article in the German military review, "Mittheilungen über Gegenstände des Artillerie-und Geniewesens," this question is discussed by Captain Freiherr v. Stipsicz. He arrives at the conclusion that, seeing that it was already impracticable to attack a position held by infantry with ordinary single loaders without previous thorough preparation by artillery fire, the necessity for this will be enhanced in the case of the defenders being armed with repeaters. To ensure this thorough preparation, he urges:—

1st. The most extensive employment possible of the fire of artillery masses;

2nd. That sufficient time be allowed in which to bombard the place at which the assault is to be made;

3rd. The direction upon this and also on the reserves of a powerful fire;

4th. Immediate accompaniment of the attack, especially by those batteries that are masked by the infantry, up to 675 or 750 metres.

These principles for the employment of artillery must exercise an influence on the organization of the field artillery, for they will necessitate a strong corps artillery. The deductions drawn by the writer for the training of field artillery in peace are three:—

1st. The most important is its instruction in every phase of fire action; more attention must be paid to firing at long, even very long, ranges.

2nd. The training in firing by masses must be attended to much more than hitherto.

3rd. The great mobility and power of manœuvring of the artillery will form one of the most important factors in firing by masses.

With the exception of the increased importance given by the writer to

¹ For a summary of contents see No. 149 of the Journal.

practice at very long ranges, his views are no doubt practical and just. The necessity for a good and strong artillery to silence the fire of the enemy's guns, and to search out that portion to be attacked, and so increase the chances of success from the infantry attack, is still greater than it was before. He who remains the victor in the artillery engagement is apparently the victor in the battle.

Fortress Tactics.

The report on this subject is divided into two portions. The 1st treats of the defensive works undertaken by the several European States, the improvement of matériel, and the organization of fortress troops. The 2nd portion is reserved for the discussion of various questions relating to fortress warfare which have been raised in the press.

As being intimately connected with the defence of the frontier, the following comparison is drawn between the lines of railway available and projected at the disposal of Russia and Austria respectively. The former has six lines which lead to the Western frontier, of which the first stops a few miles short of it; these are :—

1. St. Petersburg—Warsaw—Czenstochow.
2. Moscow—Minsk—Brest-Litovsk—Kielce.
3. Kursk—Pinsk—Ivangorod.
4. Kursk—Kief—Lub.
5. Charkof—Balta—Proskurof.
6. Odessa—Schmierinka—Proskurof.

Under certain conditions the line Odessa—Kischenef—Jassy could also be utilized.

The projected lines are four, namely :—

1. Lodz—Sierad—Wilhelmsbrück or Sierad—Kalisch.
2. Kutno—Kolo—Sluzce.
3. Pinsk—Kowel.
4. Lublin—Zamosk—Tomazof or Lublin—Ostrowice ;

the main directions of which lead also to the German or Gallician frontier.

Austria has the following lines :—

1. Prague—Olmütz—Prerau—Oderberg—Cracow—Stryi.
2. Josephstadt—Prerau—Odby—Cracow.
3. Brünn—Prerau—Oderberg.
4. Pressburg—Pesth—Chyrow—Lemberg.
5. Vienna—Sander—Chyrow—Stryi.
6. Kaschau—Tarnow.
7. Graz (Agram)—Pesth—Debreczin—Munkacz—Stryi.

These will not suffice in the future, particularly as on some portions of the system several lines run in common, and further strategical lines are in contemplation.

Italy also has not been idle in the matter of connecting her fortified places on the coast with the interior, for which purpose contracts have been concluded for the construction of the following lines :—

1. Velletri—Terracina.
2. Sparanise—Gaeta.
3. Avellino—Ponte S. Venere.
4. Genoa—Ovada—Asti.
5. Cernia—Piombino.
6. Cuneo—Saluzzo.

Besides these, the line Udine—Portogruaro is to be completed during the year, after the difficulties offered by the bridging of the Tagliamento have been overcome. Special attention is being paid to coast defence, as is evidenced by the construction on the island of Caprera of three forts, and on Maddalena of four forts, with good roads and landing places, arsenal, barracks, hospitals, and magazines. The two places are further to be connected by a bridge. The extensive works at Spezia are being continued, and several new forts have been designed. Large expenditure is also being incurred for the equipment of fortresses, construction of heavy guns, engineer matériel, and siege trains.

France and Russia have also turned their attention to coast defence—the former in connection with Toulon, Brest, and Cherbourg, the latter in the conversion of Libau into a fortified port at great expense. The importance of this port is due to the fact that at a time when the northern port is closed by the ice, Libau is open and available for the entry or egress of Russian vessels.

The works in progress in Belgium for the preservation of her neutrality, both on the Meuse line and the modifications in the fortified places of Antwerp, Termonde, and Diest, to meet the most modern ideas, have already been alluded to, and they should be completed in two or three years.

Switzerland, also, having in view the maintenance of her neutrality, has voted the necessary money for the construction of defensive works at Andermatt, on the St. Gothard.

At Bukarest, of the eighteen forts to be constructed to complete the system of defence, seven were completed during 1888, and three more commenced.

In Turkey the question of the land defences has at last been seriously taken up; an entrenched camp is to be formed at the lines of Tschataldja for 50,000 men, and the defences of Adrianople are to be reconstructed.

Amongst the improvements in matériel, perhaps the most important is the development of high explosives, and their adaptation for purposes of bombardment and mining. The Report, while referring to them and to the acknowledged difficulties in the way of their practical use in war, gives no details as to the experiments carried out in various countries, and especially in Austria. In one form and another the problem has been under consideration during the past ten years, and one important result has now been reached. Shells loaded with a high explosive substance have been fired with success, and practically without danger; but this has been under peace conditions. In war the difficulty of transport, and the fear lest atmospheric conditions, such as damp or heat, should set up chemical changes of a dangerous nature, must, in the present state of knowledge, at least limit, if it should not altogether prevent, their use.

The question of rapid communication in war continues to attract attention, and during the past year some interesting observations were made on the subject in France. From these it appears that 1 kilometre can be covered by a pigeon in 1 minute, by a hound in 2 minutes, by a bicycle or a mounted man at a gallop in 3 minutes, and by the latter at a trot in 4 minutes. The establishment of the pigeon post on an extensive scale in Russia has already been referred to. In connection with the operations about Massowa, the Italians have made practical use of the pigeon post with excellent results. Communication is not only regularly maintained between the outlying posts and the chief station at Massowa, but reconnoitring patrols take with them pigeons in baskets, to enable them to communicate intelligence rapidly back to the station from which they were sent out. If a pigeon arrives back without having a message attached, and with some of its tail feathers pulled out, it is an intimation that the patrol has been surprised.

It appears, also, that in Italy a way has been found of maintaining balloons

in the field, or before an invested fortress, for purposes of observation, without the encumbrance of a bulky train. Small balloons, suitable for one observer, have been constructed for the expeditionary corps in Africa, the necessary gas for their inflation being contained in an easily transported, small, steel cylinder. The entire transport per balloon consists of three vehicles.

The same difficulty, namely, the necessity for a bulky train, is encountered in the application of the electric light for the purposes of fortress warfare. Experiments made in Austria showed that with three wagons a powerful light can be obtained and maintained, capable of being rapidly moved. Both in Germany and in Spain experiments were made in night operations, both the ground and the object being lighted up by the electric light. In the case of the Spanish trials, it was found that in individual firing under peace conditions the hits were as 74 by day to 33 by night; but in field firing under service conditions the results were about equal. The German experiments showed that those men within the sphere of light made better practice than those without it.

Great attention has been, and continues to be, paid to the employment of quick-firing guns in fortress warfare. In Germany, experiments conducted at Krupp's factory with these guns, varying in calibre from 4 to 13 cm., of which the two heaviest, namely, the 10.5 and 13-cm. guns, appeared the most suitable for fortress warfare. The time occupied in firing one round was four and five seconds respectively. Italy has adopted the 12-cm. Armstrong Q.F. gun for use in her navy, and also the 25-mm. Maxim machine gun.

The organization and training of the troops specially reserved for fortress warfare were advanced in many European states, and Italy showed herself especially active in this direction, carrying into effect the changes in organization prescribed by the law of 1887. For the fortress artillery this entailed the increase of two of the five regiments by one division of four companies. In consequence of the increase in the number of the field artillery regiments, the numbering of the fortress artillery regiments had to be altered, and they are now numbered and their headquarters located as follows: the 25th at Ancona, the 26th at Genoa, the 27th at Rome, the 28th at Mantua, and the 29th at Capua. The instructions prepared for mobilization provide for the constitution of the following formations by the fortress artillery:—

1st. A brigade of fortress artillery for each army, consisting of the staff and one company (4 Officers, 225 men).

2nd. Troops for the artillery siege park; to be composed ordinarily of the materials for forming the park, guns divided into groups for transport, ammunition equally in groups, supplementary group (laboratory, stores, tools, materials), and the troops themselves consisting of the artillery train for the military vehicles and twenty-four companies of fortress artillery.

3rd. Garrison troops for the fortified places within the theatre of war.

4th. Garrison troops for the coast batteries.

5th. Artificers for the army artillery park.

The effect of the reorganization of the engineers has been to increase the available force of that arm from 7,000 to 8,000 men. A further step in the reorganization of the fortress troops has been to form a separate class of Officers from those employed in fortresses, to be attached to the infantry. The list consists of 6 Colonels, commandants of fortresses or forts; 9 Lieutenant-Colonels, and 16 Majors, as commandants of forts or assistants to the commandants of fortresses; 19 Captains, as commandants or assistants; and 16 Lieutenants as assistants. Besides the instruction in firing and the ordinary duties of a fortress, regular fortress manœuvres are held for all the troops allotted to them.

Russia has also taken steps to give the necessary training to the reserve

cadre-troops, which would be in great part allotted to the defence of fortresses in war. The composition of the fortress artillery in Russia for war purposes is as follows :—

1st. The siege park, consisting of 6 fortress battalions and 1 transport division.

2nd. 50 fortress artillery battalions, each of 4 companies (except two, which have 5).

3rd. 6 independent fortress artillery companies, distributed throughout the country.

4th. 3 fortress artillery detachments, each of 100 combatants, in Odessa, Nikolaief, and Astrabad.

5th. 16 sortie batteries, each of 8 guns and 2 ammunition wagons, for the larger fortresses, namely, Warsaw, Novogeorgiesk, Brest-Litovsk, Ivangorod, and Kovno.

There are in Russia two engineer siege parks, each in 4 divisions of 24 park wagons and 4 field forges. The engineer personnel for fortress warfare is formed by means of the expansion of the 5 companies into 34 reserve companies engineers (each of 224 combatants), of which 16 for siege duties and 18 for field work.

In France the amalgamation of the fortress artillery and engineers, contemplated by General Boulanger when Minister for War, has not been proceeded with.

In Part II of the Report on Fortress Tactics, the question of the value of permanent fortresses and forts is discussed with reference to the theory advanced during the autumn of 1888, to the effect that, looking to the progress made by artillery, especially in the use of projectiles charged with high explosives, permanent works have lost their defensive value. The alternative suggested was the construction, as tactical considerations might dictate, of provisional earthworks, to be furnished with armoured towers and shelters, made with the special view to their transport from place to place. In the Report the fact is accepted that, in the field, attack and defence will be more and more a matter of position warfare, and so become more or less assimilated to fortress warfare. But the argument from this, that permanent fortresses and forts can be dispensed with, is combated. The inferences drawn from the experiences of the 1870–71 war are not to be depended upon, for it is only since that war that the study of, and instruction in, fortress warfare have been seriously taken up. Had the French fortresses been defended with the knowledge and skill that have since been gained, the results might have been different. The existence of permanent fortifications does not prevent the construction, when tactical considerations require it, of strong provisional positions, as was done at Düppel, Plevna, Sebastopol, and frequently in the American war. The writer of the Report, therefore, lays it down as his opinion :—

1st. That a rational system of land defence will always be connected with such defences as are already in existence, and will not experiment with extensive changes in the fortifications.

2nd. That, looking to the value attributed to fortresses in all ages, it is not justifiable to introduce a new era of provisional fortifications, notwithstanding some examples in war which seem to favour these.

NOTICES OF BOOKS.

Battles and Leaders of the Civil War. 4 vols. 4to. T. Fisher Unwin. The Volumes weigh $5\frac{1}{2}$ lbs. each and there are 750 pages of matter in each Volume, besides an ample Index and Table of Contents. Price £5 5s.

These four handsome volumes consist of papers which have been contributed to the "Century Magazine" during several years. They have been written by men of all ranks who were engaged on both sides during the great contest between North and South in America. The quarter of a century which has all but elapsed since on April 9th, 1865, Lee surrendered to Grant, at Appomatox Court House, the sword which he had so nobly used in the cause he had espoused, has allowed the passions of those days to die out. Throughout these various articles, from whichever side they come, there is everywhere apparent an anxious desire to do justice to the gallant men to whom the writers were opposed, and, in the main, to assist in bringing out the truth whatever it may be. Many, of course, of the chief actors have long since passed away. Stonewall Jackson was, at the very moment of the successful accomplishment of one of his most brilliant *marcœuvres*, accidentally shot at Chancellorsville by the devoted soldiery whom he had so often led to victory. Lee, surviving the Civil War, and having refused the most tempting offers of lucrative positions in the North, died as Head of the University of his beloved Virginia, to the moral and physical recuperation of which ruined State he had devoted the last years of his always valuable life. The death of the victor of Appomatox has been too recent and too public a fact to need special record. The death, too, by the hand of an assassin of the great President at the moment when his large judgment, his devoted patriotism, his genial humour, sorely tried during four years of weary waiting and long alternations of success and failure, were at length rewarded by complete triumph, is an incident not likely to be forgotten as long as the great drama of their own history interests mankind. But, though these, the most prominent actors, have now passed away, one at least of them, Grant, lived long enough to contribute some valuable papers to this series, whilst a judicious selection from among his published writings has enabled the editors to make the contribution from his pen as complete as we could expect. Though the absence of anything direct from Lee or Jackson is a loss that cannot be adequately replaced, we have from Lee various official reports compiled during the War, and papers from many men who were closely associated with him. Still more is this the case with Jackson, whose habitual reticence would probably in any case have deprived us of much assistance from his own pen. He had the art of inspiring the most enthusiastic devotion to himself in other men, who have been delighted with the opportunity which these papers have afforded them of recording his methods of working, of describing all kinds of striking incidents in his career, and of repeating his pithy sentences.

Of the other leaders of the War, McClellan has sent more than one paper describing his schemes, his strategy, his difficulties, and pouring forth his passionate indignation against the politicians who, as he believed, shattered his career because they were personal enemies and were jealous of his influence over the "Army of the Potomac," which he certainly created, and over which no other leader ever exercised a similar spell. That story of his differences with the authorities at Washington, as to which we have much evidence on both sides, is a dramatic and interesting one. That "there were faults on both sides" is a conclusion to which all mankind is so ready to come in any similar matter that it scarcely needs

to be suggested. That, though McClellan lacked tact and judgment in his dealings with the civil authorities, who had responsibilities for which he did not make adequate allowance, and though he was not without his faults as a commander, he was in the main right, and that those authorities were wrong, is a verdict which has already been passed by impartial history, and is fully justified by the evidence supplied in these papers. The "Century" papers acquire a special interest in regard to McClellan from the fact that, apparently, it was the excitement produced by the attempt to recall and to set forth the feelings which had been in his mind at the moment when he was, by Halleck's recommendation, withdrawn from the "Peninsular Campaign" that caused or, at least, fixed the time of his death. One night he put aside his writing at the moment when he was actually engaged in penning a sentence vehemently expressing the pride with which he and his old army would always look back to those seven fierce days of battle when, after their crushing defeat by Lee and Jackson at Gain's Mill, they successfully effected their retreat from before their skilful opponents, and, turning at Malvern Hill to face their pursuers, drove them back with heavy loss. The incomplete page is presented to us as it was written. The morning after he had been working at this paper, McClellan's sudden death appeared to indicate that the excitement of these recollections had proved too much for his overstrained temperament. Sheridan similarly lived long enough to contribute some valuable papers. His recently published memoirs will for many European readers give a fresh interest to whatever comes from his pen. Stuart, Sheridan's great rival as a brilliant leader of mounted infantry, left the stage of life at the very moment when Sheridan was, in the Richmond Raid, pushing forward to the front of it. Stuart's fall, on May 12th, 1864, almost exactly fixed the moment when ascendancy in the mounted arm passed from the Southern to the Northern side. We have here, from many men who served under him, good and clear accounts of Stuart's brilliant performances. Of the other commanders of armies, most are still alive, and I think that nearly all of them have contributed more or less to these volumes. Sherman has described his march to Atlanta, and has discussed the strategy of his great leader, for whom he is most anxious to assert a position superior to Lee as a General. That position even the greater number of those who served under Grant do not seem very willing to assign to him. It is tolerably safe to say that impartial military opinion in Europe will not accept Sherman's verdict in this respect. Nevertheless, his paper on the subject is very valuable and instructive, as is also his explanation of the vital importance of his second march from the sea through the heart of South Carolina, of which he complains with some justice that no proper estimate has been hitherto formed by military critics.

Of the other names familiar to European readers, those of Beauregard and Joseph E. Johnston, the joint victors at the Battle of the first Bull's Run, appear as the writers of many papers. Unfortunately a personal dispute as to their respective shares in the first great Southern victory mars to some extent this part of the work. It is, however, safe to say that the story of Bull's Run can never be told again after the fashion which has been current in Europe by anyone who has studied the evidence here supplied. It will, I think, be a surprise to many of even the readers of this paper to be told that the troops of Johnston transferred to the support of Beauregard did *not* disembark from the trains and march directly to the field of battle in a direction which brought them on to the exposed flank of the Federal Army. That story is treated by Beauregard, who superintended personally the movement of the troops, as a silly fiction: "Errors that have been repeated by a number of writers, and particularly by an ambitious but shallow French writer," vol. i, p. 217. The troops, in fact, detrained at the railway junction at Manassas, which is completely in rear of the right of the position of those troops who fought the battle, while the victory was gained by turning the Federal right. Stonewall Jackson, with his brigade of Johnston's Army, had been present on the previous day, and, in fact, only a relatively small portion of Beauregard's own army took part in the battle at all. It would take more space than I can afford to show how very interesting a point the facts as here recorded raise as to the kind of service which railways are likely to render to a supporting force destined to be brought on to the field of a battle, actually begun at the time they are still in the

trains. It is at least safe to say that the facts as we now have them are much more in accordance with the fixed necessities of railway movement of troops than was the somewhat sensational story on the subject which has passed for history.

From Beauregard we have also, as we have very fully from other pens, an account of the Siege of Charleston. I should like to persuade all those who have been interested in the question as to the relations between forts and ships which has occupied successive lectures and discussions in the Institution to read the story of the naval attack on Charleston as it is here told. Both naval and military Officers will, if I mistake not, find food for reflection in it. They will, I think, come to the conclusion that what Admiral Dupont and his picked Captains, assisted by the whole resources of the States, failed to accomplish, is likely to prove a tough job for any navy. At all events, for four years Charleston held out, Charleston which had been responsible for the actual beginning of the War by the attack and capture of Fort Sumter from the Federal Government, Charleston which was the most important harbour towards which blockade runners continually ran, Charleston the accursed as it appeared in the eyes of the whole North. However, the circumstances must be studied in detail in order to be understood, and I only wish here to record the fact that the evidence will be found in these pages, both of many Confederate Officers who, with Beauregard, took part in the defence, and of the Officers both of army and navy who were engaged in the attack. Dupont himself, however, died some years ago, and the vindication of his memory, which is very complete, has been necessarily left to the hands of others.

From Beauregard we have also some very interesting papers which show the part which he played in the great Battle of Shiloh in the West, in which Grant so narrowly escaped defeat. Of the actual Southern commander in that action, who was killed during the first day's fight, Albert Sidney Johnston, we have many valuable reminiscences, and we have as usual quite as complete records on the Northern side from Grant, Sherman, Buell, and others.

Beauregard also supplies most instructive papers as to the period during the last year of the war, when he was in command of the troops to the south of Richmond opposed to General Butler during the time that Lee was fighting his "Wilderness Campaign" against Grant.

Joseph E. Johnston, for whose ability all those who fought against him have profound admiration, gives his own account of the campaign against Sherman from Dalton to Atlanta. It is rather remarkable that, while at the end of that campaign when Sherman had forced his way to Atlanta, Johnston was superseded by the President of the Confederacy as having failed; and while Hood, who succeeded him, declares that the morale of the Confederate Army had been seriously impaired by the long trench work and continued retreats which had characterized Johnston's part of the campaign, the Federal Army, from Sherman downwards, seems to have hailed Johnston's removal as a positive boon. On the whole it is tolerably clear that up to the moment of the change of commanders the Federal Army, despite their considerable numerical preponderance and great superiority in matériel, had gained very little that was in a military sense decisive.

I perhaps ought to note that it is necessary to distinguish between Joseph E. Johnston, who commanded at the First Bull's Run, who subsequently at the Battle of Seven Pieces narrowly missed crushing McClellan, and in all probability would have done so had his orders been properly carried out, who, after a long delay, due to severe wounds received in that action, commanded in the West against Grant during the Vicksburg campaign and against Sherman in that of Atlanta, and Albert E. Johnston, who commanded and was killed at Shiloh in the West. The former was one of the older Officers of the War, looked up to as a military authority and soldier of the first rank by most men in both armies. Albert E. Johnston was a soldier whose short career inspired the Southern West with the highest hopes, leaving them in despair at his premature death.

McDowell, the defeated of the First Bull's Run, does not contribute anything, and appears to have died in retirement some years ago. The general effect of these papers is, however, to throw the responsibility for his defeat upon the authorities at Washington and the follies of the American public, and, to a very great extent, to redeem his fame. There is much to be said for his plan of campaign had he been

properly supported. Of the successive victims of Lee's victorious career during the earlier part of the war, Pope, the defeated of the "Second Bull's Run," "Jackson's commissariat Officer," contributes a very interesting paper which throws great light upon many facts connected with the administration of the War Office at Washington by Stanton, the Minister of War, and Halleck, who from the time of the "Peninsular Campaign" up to the "Coming of Grant" was at least the nominal commander-in-chief of all the armies of the North. Hooker and Burnside, the defeated of Chancellorsville and Fredericksburg respectively, are not among the writers on these battles, though Burnside contributes an interesting paper on his successful coast expedition. Bragg, Hood, and Ewell, among the Confederate commanders of armies, contribute papers on their campaigns. It is some indication of the portentous size of the struggle as well as of the wealth of materials contained in these volumes, that I have hitherto mentioned hardly anyone who was not in command of an independent army on one side or the other. Nor have I named all these. The careers of Forrest, George W. Morgan, Kirby Smith, Buell, Fremont, Lyon, Pearce, Sigel, Van Dorn, and Polk in the West, of which we have here many details, are full of interest. Longstreet was only at one brief period actually in command of an independent army; but, from the death of Jackson, he was Lee's most important Lieutenant. From him we have many papers, very able, very instructive, but marred by personal jealousy and personal animus of all kinds to an extent which is the case with no others in this series. His criticisms are irritating reading.

In addition to these papers by the actual leaders of the war, we have the admirable correction of independent reports from almost each of those who in each campaign held any very important subordinate positions. Thus as regards the Battle of Gettysburg, which virtually crushed the last chance that remained to the South for securing their independence, we have papers from General Longstreet savagely criticizing Lee's generalship; a most effective reply from Colonel Allan, who was on General Lee's staff at the battle; and in all twenty-seven independent papers from various hands on the different parts of this most interesting battle. Of these ten are from Confederate Officers, including, besides Longstreet himself, General Law who succeeded Hood in command of the right of Longstreet's corps. He supplies an account of part of the action, very important and hitherto much ignored in the stories of the battle. We have also from the same corps a valuable paper by Major-General Kershaw who commanded a brigade of McLaw's Division. Then we have other accounts of the famous charge of Pickett, Pettigrew, and Trimble on Cemetery Hill; two papers on the Confederate cavalry in the battle by Colonel Morley and General Robertson, and an account of the artillery from General Alexander who commanded them. Last, but not least, on this side we have from General Imboden one of the most terrible but also most graphic and interesting papers I have ever read describing his conduct of the convoy of the wounded who were sent back by Lee away from the general line of the retreat of the army, and after the most appalling sufferings due to want of equipment, want of time to tend them, and the necessity for pushing on in rough wagons over rough roads, were at last only saved from capture by a combination of ruse and valour that reads like a romance, but is full of practical suggestiveness for similar work. I think, however, that no one who reads the paper will fail to hope that it may never fall to his lot to have such an awful task to undertake.

The Federal papers on the same battle are even more ample. I suppose that no battle of that war, nor therefore certainly of any war, unless it be the battle of Waterloo, has had so much written about it as Gettysburg; yet even here an entirely new light is thrown on many incidents.

I have taken this battle as an illustration of the variety and wealth of the materials which are supplied in regard to almost every part of the war, from first to last.

One element of very considerable interest is due to the fact that men of the highest education were serving on both sides in the ranks. Thus Mr. Warren Lee Goss, who served as a full private and recounts his experiences from the time that he went up to offer himself for enlistment, offers us some very amusing and suggestive papers. These are especially valuable in the case of the Peninsular campaign, in

regard to the time when McClellan was shaping the Army of the Potomac out of a heterogeneous mass of nondescript recruits, and with reference to some of the earlier periods of the war. No one who reads them thoughtfully can, I think, fail to derive some suggestions as to the way in which great strategical movements and their consequences make their effect felt in the ranks. Similarly we have a picture from the private's point of view of Jackson's movements furnished us by Allen C. Redwood.

The Comte de Paris, who acted as McClellan's Aide-de-camp throughout the Peninsular campaign and was present with him during all the period of organization, supplies a valuable study of McClellan as a General. Everyone who has occasion to refer to a history of the war in these papers appears to be agreed that that by the Comte de Paris is by far the best that has been written.

Nor are the pens of ladies wanting to supply many reports about the war as it made itself felt in the homes and hospitals of the South.

The naval operations are very fully described. Apart from the description of the attack on Charleston, of which I have already spoken, we have most admirable accounts of Farragut's brilliant exploits in the capture of New Orleans and in Mobile Bay. We have also from several of the immediate actors reports of the fight between the "Alabama" and the "Kearsage," as well as of the fitting out and voyage of the former cruizer and of her ravages which, in the long run, proved so costly to England.

Moreover, apart from these matters of specially military and specially naval interest, there is throughout the war a feature of peculiar interest to English Officers of both services. The great rivers, which pour their waters into the Southern seas of the States, formed such a magnificent network of water communication throughout the Southern "Confederacy" that their retention was vital to the interests of the South, and it became the great purpose of the North to secure complete possession of them. That achievement was second only in importance, even if it were second, to the necessity for defeating Lee's army and seizing Richmond. Hence it happens that combined naval and military operations, such as are continually carried on by us whenever we desire to put forth our power, are a marked characteristic of the whole four years of war. The kind of co-operation which is necessary, and the kind of assistance which either service can render to the other receive continual and most useful illustration.

Anyone who first takes up these volumes will probably be at once struck by a feature in them to which I have as yet made no allusion. They are profusely illustrated. The illustrations are of all kinds. Portraits, for the most part very life-like and suggestive portraits, of all the chief actors in the great struggle are given us. Sketches of scenes of rather general than strictly military interest abound. In so far as the illustrations are used to popularize the narrative, to make the exciting stories of personal adventure, of dashing raids, of partizan warfare, more readable for the boys and the ladies, nothing could be better. Indeed I think that he would be a very dull and unenthusiastic schoolboy who could not bury himself with as much delight in many of these descriptions of real life as in the best fiction of Mr. Haggard. But when one turns to the maps and plans, which are quite as largely supplied, those which ought to make the reading of the text easy for military purposes, the gift, which as you turn over the pages to see what is in store for you, looks so promising, turns to bitter disappointment. I suppose that, with such a vast continent to deal with, and with the continual progress and change which takes place in America, it must be peculiarly difficult to get exactly accurate maps of the country as it was at a particular date. But, though no doubt the labour required would have been considerable, it would certainly have incalculably added to the value of the work if some one of the editors had read over the text, line by line, with a view to seeing that every place mentioned in it was given in some map; that the spelling of text and map was identical; and that the maps and plans were so arranged as to carry us on conveniently from the larger movements of the campaigns into the detail of the battles. Anyone who has realised the unspeakable comfort it is in studying the campaign of 1870 in the Prussian Official History, to have this work done for one with an almost ideal perfection, is perhaps a little spoiled for any military book that does not come up to that high standard. But I entertain so very high an idea of the value of these four volumes, which it must have

been both a most laborious and a most costly task to bring out, that I cannot refrain from expressing very strongly my regret that there should be anything in them which will, not to put too fine a point on it, certainly make all real military readers out of temper with the editors. There is nothing that I know of that is so annoying as just to miss being able to follow out a most interesting series of operations because you cannot find out the places that are referred to by the writer. This, unfortunately, happens here again and again. It is the one blot on the book.

I have in this description of its chief contents not attempted to preserve any strict chronological sequence, but have instead adhered to the personal connection between the several papers contributed by the various writers. My motive has been this. To my mind the great value of the book depends on the essentially personal character of the papers, and the variety of the lights which are thus thrown upon the different phases of the war. A connected, a well-reasoned, an ably-written history has, of course, a special value of its own. It would, perhaps, hardly be possible for a reader who knew nothing from any other source of the sequence of the events of the American War to arrive at an absolutely complete and connected knowledge of the whole history of the struggle from these papers alone. I do not know that there would be many gaps left unfilled if he worked through them with the distinct object of constructing for himself such a history. But the labour would certainly be considerable. On the other hand, looking at the matter from the point of view of a soldier who desires to fit himself, by acquiring the experiences of others in the past, for safely undertaking the awful responsibility of commanding men, whose lives are in his hand, I cannot imagine anything more instructive than such a set of papers as these. After all, the difficulty in reading military history is usually to get a graphic picture of the facts as they presented themselves to the people who were engaged in them. The historian is obliged, in order to produce a true and connected narrative, to compare, to collate and to summarize. In doing so the personal element is almost completely expelled, except in regard to the actual chiefs, and perhaps in regard to specially important traits in certain subordinates, who have directly influenced events. Now this personal element, the presentation of which brings before us the way in which others have had to deal with the great problems of war, is of incalculable importance in making real and lively the picture of events. By itself, if no attempt had been ever made so to collate the experiences of war as to show what principles tend to shape the course of events, and to determine success and failure, no doubt this would not offer very clear help to one who studies the past in order to realize the future. But that is not the case. The general principles of the conduct of armies are in the main simple enough, and are easily known to any one who takes the trouble to make himself acquainted with them. Only in war, as it has been well said, it is the simple that is so very difficult. What then can be more interesting to any one who has at all realized the genius for war of such a man as Lee, than to have supplied to us, as we have here, reports of conversations between Longstreet and Lee as to the principles on which, for instance, the campaign which actually led up to Gettysburg should be conducted, and then to see in practice what Lee did, and to realize why he did it; or, again in Jackson's case, to have, from subordinates of different ranks, statements of the effect of Jackson's action upon them, to see how his reticence and his principle of letting no one know what he was doing, provoked this man, or that, how Jackson's action came to be justified in their eyes, what the method of his rapid marches in detail was, what his avowed principles of action were, and how he applied them, where he missed his strokes, and where he made good his blows. If I might express the element in these papers which has given me the greatest satisfaction in reading them, I should say that it was the flesh and blood in them. And this does not apply merely to the greater leaders. From the variety of points of view, and the variety of the ranks of the men who have contributed to them, you get a sense of dealing with armies of flesh and blood, and not with mere war game counters, unique in my experience of history. To some extent Kincaid's "Rifleman in the Peninsula," and "Random Shots by a Rifleman," and Mercer's account of his own experiences in the Waterloo campaign are works which, like Gleig's "Subaltern in the Peninsula," contribute towards the

same effect as regards Wellington's campaigns. But the volume and extent of experience collected in these "Century" papers is so enormous that I do not know where anything to compare with them, or anything to be named with them, exists in regard to any other war. Of course it follows from the very nature of the case that every reader is left very much to draw his own conclusions, and probably the conclusions that different readers will draw, as to some of the points which remain in dispute, will be very different. Those who want *ex cathedra* decisions as to what ought to have been done in this case or that, or who was to blame for this disaster or that blunder, will not find them here. Not that there are not plenty of writers who assert their own views with sufficient dogmatism, but that usually if one man curses a particular proceeding from one mountain top, another blesses it altogether from the top of the opposite mountain.

Under these circumstances, I think, that not a few readers will be glad to have some critical guidance through such a mass of conflicting views. Fortunately I am able to tell them where they will find just such a military study of these papers. Indeed, one chief purpose which I had in view in accepting the editor's proposal that I should give here this sketch of the contents of these volumes, was to draw attention to another series based upon them, the existence of which is, I fear, likely to be unknown to many English Officers. The "North American Review" is, I believe, the oldest of the great American reviews of the type of our "Quarterlies." It has been, within recent years, restored to all, and more than all, its former vigour and influence, by the energy and ability of its late editor, Mr. Allen Thorndike Rice, whose recent sudden death, at the moment that he was starting for England on one of his many visits to this country, startled his many English friends. Of the extent of its circulation in America some conception may be formed from the fact that a copy, which happens at this moment to lie before me, to which Mr. Gladstone contributed a paper on Colonel Ingersoll, is part of the sixty-ninth edition of that number. To draw attention, therefore, in these pages to any papers that may be coming out in such a periodical seems, if one may say it with all respect to our valuable Institution, rather like announcing the existence of the "Times" through the columns of the "Skibbereen Eagle." But, so far as I have observed, the "North American Review" is not as well known in England as it ought to be. I cannot myself get it from Smith's circulating library. I see it on no club table. Mudie does not appear to circulate it. Therefore, I think, I shall do a service to many readers of this journal if I mention that Lord Wolseley is engaged in writing for the "North American Review" a series of exhaustive articles, critically examining the military conclusions to be drawn from these papers on the American Civil War. About four numbers of this series have already appeared. The third, which is the last I have seen, carries the subject about half way through the second volume, so that in all there will apparently be about seven or eight articles. He has examined consecutively each campaign and battle of any importance, and has discussed the evidence furnished in these papers with regard to it. As he was himself present with Lee's Army during the Antietam campaign, his critical remarks are interspersed with personal recollections. As he was during the whole course of the Civil War, from the time of the Slidell and Mason affair and the landing of our expeditionary force in Canada, watching the campaign whilst himself on the American Continent, and studying from day to day every scrap of information that could be gathered about it, he starts with an intimate knowledge of the whole story which, other things apart, cannot but be of service to those who feel the want of a collecting link in the reading of these valuable, but not always very consecutive papers. The articles in the "North American Review" have already been attracting a very great amount of attention in America, and have been very kindly received there. Indeed, as far as I have ascertained, their only hostile critic has been the late President of the Southern Confederacy, Mr. Jefferson Davis. As Lord Wolseley's view, that the mistakes of the President were the principal cause of the failure of the Confederacy, has been already expressed in articles written for English magazines, it is not very surprising that Mr. Davis and Lord Wolseley should somewhat differ in their views of the war. Unfortunately for the ex-President, the "Century" papers are full of the severest criticism of his conduct of the war, both from a

political and military point of view. All those criticisms proceed from those who were devotedly attached to the cause of which he was the ostensible leader. The feeling among all who write on that side of the question appears to be pretty much what Lord Wolsley expressed in an article in "Macmillan's Magazine" on General Lee a year or two ago. Naturally, therefore, Lord Wolsley has taken occasion to cite this confirmation of his views. Equally naturally President Davis, who did not like the article on Lee, likes the articles in the "North American Review" still less.

I do not propose myself to attempt in these pages to do more than suggest to the readers of this journal the rich field which lies open to them in the "Century" volumes and in the "North American Review" articles. To attempt in such space as is here possible any critical study myself of these four years of war over a continent in which at almost every moment about three independent campaigns were going on, and not unfrequently a good many more, would be absurd.

On the question, however, of the value, for the purposes of military study, of this war, I have some remarks to make. To those who think that a little practical test is worth a good deal of abstract discussion, perhaps the most convincing evidence I can offer of the truth of the opinion, I strongly hold, that the War is full of instruction of all kinds for soldiers would be to ask those, who have not already done so, to read the admirable short study of the Fredericksburg Campaign, published anonymously about two years ago by an English Officer. Those who have read it will not, I think, require to be convinced that, at least from some parts of the war, valuable lessons for present use may be deduced. There is, however, perhaps one misfortune in taking Fredericksburg as a representative campaign; that of all Lee's earlier campaigns it was the one that depended most, for the crushing part of the Confederate success, upon the effective use of defensive works and a defensive position. So used, it rather tends to confirm an impression in regard to the whole of the war, which was very general immediately after its conclusion. That impression was, I believe, very happily summed up by an able English soldier in a conversation with General Grant. That man of few words happened to be travelling on board ship with the Officer in question, and asked him what lessons he thought were to be deduced from the American War. "Spades and Mounted Infantry," was an answer so laconic, and, if it be a true summary, so pithy, that it might have come from General Grant himself. I believe that, certainly in form, probably in matter, the answer much pleased the General. I do not think, however, that the effect of the complete view of the whole war presented by these papers tends to confirm the conclusion which the words are apparently intended to convey. Apparently their meaning is that under the conditions of modern war the chief mode of fighting must be that of infantry behind earthworks, and that of men with firearms on horseback replacing cavalry. Neither of these deductions appears to me to be soundly drawn from the premises. I may, perhaps, venture to speak with the more freedom on the subject, because I have always combated the exactly opposite conclusion, which was as, I think, too hurriedly drawn from the experiences of the War of 1870. In that war the continual successes of the attacking Germans were quoted to show that the change in weapons had increased the advantages of attack over defence. In both cases alike it appears to me that hasty conclusions have been drawn from not taking account of all the facts. It is quite true that during the last year of the Civil War, both in the West and East, a great part of the fighting came to be a contest of earthworks against earthworks. It is quite true that at Gettysburg, at Fredericksburg, at Cold Harbour, and elsewhere, disastrous defeat was inflicted on troops attacking. But in the first place, during the greater part of the war, rapidity in marching and manœuvring asserted all its old supremacy. I would particularly ask anyone who does not recall the extent to which this feature was prominent, to read Lord Wolsley's summary of Jackson's operations in 1862, and his comments on their success. In the Shenandoah Valley, Jackson in 1862, with a total force of 17,000 men, paralyzed the action of at least 80,000 men, according to the very careful estimate of the Northern editors of these papers. He was actually fighting 44,840 of these in the valley, not including 7,000 more at Harper's Ferry, who had to be

reckoned with as part of the army against which he was employed. He always contrived to be in superior strength on the successive battle-fields in which he then fought, and, at the end of the campaign, having left the Federal Army on that side of the theatre of war, despite its overwhelming numerical superiority, helplessly awaiting his attack in some unknown direction, and, having created the greatest alarm at Washington, lest his little army should make its way thither, instead of any of the 80,000 finding their way towards Richmond, he transferred secretly his entire force to the Peninsula. There his arrival enabled Lee to devise one of the most telling strokes of the war, one which in fact resulted for the time in relieving Richmond from all danger of attack. These are not results which could have been secured by any merely defensive operations, however brilliantly devised. The lessons they teach are not those of "spades" or even of "mounted infantry," though Jackson's "foot cavalry" almost, from their rapidity of movement, approached the character of that valuable arm.

Again, at Chancellorsville, at both the Bull's Run battles, and in many of the Western campaigns, notably in Grant's brilliant series of movements and victories just prior to the Siege of Vicksburg, the old principles of successful strategy, ruse, concealment, accurate information of the enemy's movements, sudden transfer of force, concentration against a dispersed enemy, moral ascendancy, the seizing of the initiative, the doing of the unexpected, asserted all their old supremacy.

Those who believe in the spade as the chief weapon of modern war will find among the writers of this series an able advocate of their views. General Longstreet tells us that, prior to the Gettysburg campaign, he pressed upon General Lee the importance of adhering strictly to the method of defensive tactics alike in offensive and in defensive strategy. I do not know what effect his arguments will produce on others. On me they leave just the opposite impression to that which he would wish. He does not tell us very clearly what was Lee's share in the conversation. He rather makes one disposed to think that, though he declares that Lee accepted in principle the truth of what he urged, Lee was in fact strictly adhering to the advice "Take all men's counsel, and reserve thy judgment." At all events, on the very next occasion on which Lee had to choose between taking and rejecting Longstreet's proposals, he deliberately rejected them. Unfortunately for him, he had to rely for the carrying out of his schemes on the very man whose advice he was rejecting. If one point comes out more clearly than another from the consensus of opinion presented by these papers, it is that, had Jackson been in Longstreet's place at the Battle of Gettysburg, Lee's schemes would have been crowned with success, and the Battle of Gettysburg would have been an overwhelming victory for the assailants. Longstreet, with no adequate appreciation of the genius of the chief under whom he was serving, had no heart in carrying out a method of fighting of which he disapproved. The result was the ruin of the Confederate cause. Moreover, there is a narrowness in the very statement of General Longstreet's views which at least suggests that he suffered from a difficulty from which few soldiers are able to emancipate themselves. It is very hard for any of us to avoid attaching an altogether undue importance to our own particular experiences. Longstreet tells us that the great argument that he pressed upon Lee in behalf of the adoption of a purely defensive tactical attitude, was the brilliant success of his own wing of Lee's Army at the Battle of Fredericksburg. Even in his view of that battle, he appears to me altogether to do injustice to the skill of Lee's strategy, which induced the Federal commander to attack, and to the importance of the unexpected presence of the whole of Jackson's force on the right wing at a time when Burnside supposed that the greater portion of them at least were miles away. Moreover, you cannot base the whole conduct of a war upon the assumption that you will always have to deal with an enemy who will attack just when he ought not to do so. Now, at Fredericksburg, even Burnside recognized that the attack was a preposterous blunder. He was forced into it by the Washington politicians. Yet again the historical examples by which Longstreet enforces his conclusion are curiously wanting in accuracy. Describing his own predictions in regard to the War of 1870 at the moment when MacMahon was beginning the disastrous march which led to Sedan, he says (p. 354, vol. iii) that he declared that the Prussians would interpose, and "force MacMahon to attack."

"Had we interposed between Meade and Washington our army, in almost as successful prestige as was that of the Prussians, Meade would have been obliged to attack us wherever we might be pleased to have him. He would have been badly beaten like the French, and the result would have been similar." From which it is to be inferred that General Longstreet supposes that the Battle of Sedan was one in which the French were the assailants and the Prussians in occupation of a defensive position. As in fact throughout the day the Germans were engaged in a series of fierce attacks upon the French, and only when the end was near were the French forced into hopeless and disjointed counter-attacks, the historical argument loses its point. In fact, had Longstreet, by throwing in his whole force, succeeded in capturing the Peach Orchard and the two Round Tops, driving in the Federal left, the result would have been almost exactly similar to what happened at Sedan. The Federal right and great part of the centre, if they had succeeded in extricating themselves at all, could only have done so by most costly counter-attacks upon the Confederates in possession of the positions which they had seized.

That a war of intrenchment was forced by circumstances on General Joseph E. Johnston during the Atlanta Campaign, and that, from strategical considerations connected with the impossibility of shifting his line of supply, Sherman was forced to reply by a system of counter-intrenchment instead of manœuvring the Confederates out of their works cannot be denied. Nor is it doubtful that, when after this Hood substituted a series of dashing movements and dashing attacks for the Fabian policy of Johnston, the result was disastrous to the Confederates. Similarly, during the latter part of the war, the contest between Lee and Grant resolved itself virtually into a great siege, of which, of course, intrenchment and counter-intrenchment, mining, and assaults became the chief factors. That, however, was simply because the limits within which Lee could operate had been gradually, by the overwhelming force of the Northern armies, circumscribed. Moreover, both in the Atlanta Campaign and before Richmond, there are not a few indications of the old danger that those who learn to fight successfully behind intrenchments shall learn not to fight as vigorously when not protected by them. Something of the old Confederate dash and go seems to have been lost both in east and west from the time that the spade became the great weapon of the war. I think also that any soldier who reads the very able and suggestive papers of General Beauregard will see that there were opportunities for successful strategy in the field in the old sense of the term prior to the junction of the armies of Butler and Grant which would probably have had very important results, and might have been far better for the Confederacy even at the last than the recourse to the spade work which in the long run proved so disastrous to them.

For my own part, I am convinced that the fair conclusion from the whole evidence as it here lies before us is, not that the spade is an instrument to be discarded, nor yet that it is to be treated as the queen of weapons. But here, as always in war, balanced judgment, a knowledge of the power of attack, of the advantages of the initiative, and also of the overwhelming material and local gain which modern weapons give to the defensive, when properly applied, are the important matters. The whole of the circumstances, the moral and material condition of both armies, the nature of the country, and the opportunities presented for either course of action, must be all considered in each case by the man who would succeed. A fixed rule will not apply. Therefore it is that such a study as these papers afford is of such great value. They suggest the infinite variety of circumstances which present themselves in war. They indicate how sound principles work themselves out amid the variety of circumstance. They are, in fact, an enormous collection of experience. It is true that the conditions were in many respects peculiar, that the armies were not exactly like the trained regular armies of Europe. But it is idle to suppose that by the end of four years of war the greater proportion of the combatants had not become for practical purposes more effective fighting soldiers than the majority of the modern short service men who have not spent as long a time in peace service as these men spent in the training of war. From the time that McClellan formed the Army of the Potomac, that army at all events was as regularly organized, as completely equipped, and almost as strictly disciplined as most European armies. The Southerners had the advantage

of commanders of greater genius. Their men had greater devotion to the cause, and had perfect confidence in their leaders. That they had to depend for successful action on equipping themselves from the resources of their opponents does not seem to me, during at least the earlier years of the war, to have been so serious an injury to their cause as the fact that it was seldom possible to follow up victory because of the tendency of the men to lose their cohesion, and often to some extent to disperse to their homes when victory had been won. Again and again, it looks as if a vigorous pursuit ought to have altogether broken up the defeated Federal armies. Again and again, the chance was missed. Certainly it was not because either Lee or Jackson did not appreciate the importance of pursuit. I think that there are indications in these papers that some such cause as that which I have described powerfully operated. Enthusiasm properly disciplined is an enormous power. Certainly the inference which one draws from these papers is not that enthusiasm is a substitute for organization or discipline.

In conclusion, I cannot too strongly recommend the book to the attention of those who are for any reason interested in the records of war. If the readers of this paper will endeavour to insist on the presence of these volumes and of the "North American Review" in all libraries, permanent and circulating, they will, I think, be doing useful service.—J. F. Maurice, Colonel.

Rambling Reminiscences of the Punjab Campaign, 1848-9, with a brief Sketch History of the 24th Regiment from 1689-1889. By Lt.-Col. A. J. MACPHERSON. Chatham: Mackay, 1889. Pamp. Pp. 104. Price 1s.

We wish all rambling reminiscences were as well worth reading as these.

The Woolwich Handbook. London: Clowes, 1889. Pp. 120. Size $7\frac{1}{4}'' \times 5'' \times 0\frac{1}{2}''$. Weight under $\frac{1}{2}$ lb. Price 2s. 6d.

This is a very useful little book for parents and guardians having the Artillery or Engineers in view for those whose future is to be determined by them. It gives a great deal of useful information as regards preparation for their entrance into the R.M. Academy and work there. At p. 20, however, we read, "The reluctance to any aspect of advertising on the part of certain preparatory schools of note has caused the editor to abandon an intention to indicate by name some of the longest-established and best-known preparatory schools." But in the very next paragraph he proceeds to name one school, from the proprietors of which, "having obtained permission to express his conviction that their school (from which his two sons obtained scholarships at well-known public schools) fulfils all the requirements above detailed, he has much pleasure in recording his high opinion of its merits." We congratulate both the crammers and the tradesmen whose names are mentioned in this book on an advertisement "free, gratis, and for nothing;" but the appearance of these names is a decided disfigurement in an otherwise, as we have said, useful book.—L. A. H.

Two Lectures (enlarged for Publication) delivered at the School of Musketry, Hythe, June, 1889. By Colonel W. MACKINNON, Chief Instructor. Hythe: Payne. Pamp. Pp. 18. Price 6d.

These two lectures are on the volley and on the instruction of recruits and trained soldiers, and are well worth reading.

The Command of Artillery in the Army Corps and the Infantry Division. By Major-General HOFFBAUER, Commanding 5th Prussian F.A. Brigade. Translated from the German by SPENSER WILKINSON. Manchester: Cornish, 1889. Pamp. Pp. 38. Price 2s. 6d.; postage 2d.

The title of this pamphlet is somewhat misleading. The pamphlet is really one of those excellent studies in applied tactics similar to others which Captain Spenser Wilkinson has from time to time given us through the medium of the Manchester Tactical Society. It follows the course of an imaginary action, mainly from an artillery point of view, and it is full of practical suggestions.

Life of the Marquess Wellesley, K.G. By Colonel G. B. MALLESON, C.S.I. Pp. 233. Size $7\frac{1}{4}'' \times 5'' \times 0\frac{3}{4}''$. Weight under 14 oz. Price 2s. 6d.

Life of the Marquis of Dalhousie. Captain L. T. TROTTER. Pp. 228. Size $7\frac{1}{4}'' \times 5'' \times 0\frac{3}{4}''$. Weight under 14 oz. Price 2s. 6d.

These are two volumes of the Statesmen Series, edited by Lloyd C. Sanders, and published by Messrs. Allen and Co.

Prospectus and Plan of Elson's Maritime Code of Signals. Calcutta: Banirji, 1889. Pamp. Pp. 11.

Mr. Elson gives here a specimen of a new scheme of universal marine flag-signalling, and supports it also by the names of 155 shipmasters and others who approve of his scheme.

Embarkation and Disembarkation of Troops. By Colonel G. A. FURSE, C.B. Portsea: Holbrook and Son, 1888. Pamp. Pp. 74.

Colonel Furse is an authority on this subject, and in this pamphlet gives the result of practical experience gained whilst employed as Embarking Staff Officer at Portsmouth.

Army and Navy Calendar for the Financial Year 1889-90. 9th edition. Compiled from authentic sources by JOHN HAZARD. London: Allen and Co. Pp. 295. Size $8\frac{1}{2}'' \times 5\frac{1}{2}'' \times 1''$. Weight under $1\frac{1}{2}$ lbs. Price 2s. 6d.

A very useful publication, giving a great amount of information about Army and Navy matters. The maps of stations are a prominent feature in the work. It is a sort of Service "Whitaker." Can we say more?

Words on Wellington, The Duke—Waterloo—The Ball. By Sir WILLIAM FRASER, Bart. London: Nimmo, 1889. Pp. 344. Size $8\frac{1}{4}'' \times 5\frac{1}{2}'' \times 1''$. Weight under 1 lb. 10 oz. Price 7s. 6d.

Wellington. By GEORGE HOOPER. London: Macmillan and Co., 1889. Pp. 254. Size $7\frac{3}{4}'' \times 5\frac{1}{4}'' \times 1''$. Weight under 1 lb. Price 2s. 6d.

The cry is "Still they come"; but they cannot be too many, and the more we hear about Wellington from different sources the better we shall understand him. Mr. Hooper's work is one of the series of "English Men of Action."

History of the XXth Regiment, 1688-1888. Compiled by B. SMYTH, Lieutenant; Quartermaster 1st Lancashire Fusiliers. London: Simpkin, Marshall, and Co., 1889. Pp. 410. Size $9'' \times 6'' \times 1\frac{1}{4}''$. Weight under $2\frac{1}{4}$ lbs. Price 15s.

We congratulate Lieutenant Smyth on the result of his labours. The Double X have found a thoroughly competent historian. The Appendix is by no means the least interesting part of the book. In it we find a specially valuable extract from a volume chiefly composed of regimental orders published by Lieut.-Colonel James Wolfe, the future hero of Quebec. The history is well worth perusal by others beyond the circle of old Twentieth men.

Life of Charles Blacker Vignolles, Soldier and Civil Engineer. By his son O. J. VIGNOLES. London: Longmans, Green, and Co., 1889. Pp. 398. Size $9'' \times 6\frac{1}{4}'' \times 2''$. Weight under $2\frac{3}{4}$ lbs. Price at Hogg's, Charing Cross, to Members R.U.S.I., 11s.

The career of the subject of this biography is somewhat romantic. Born on 31st May, 1793, and left an orphan when hardly a year old, he was appointed Ensign in the 43rd Regiment on the 25th October, 1794, at the age of one year and five months, but the small infant was to exchange to half-pay as being *too young to serve*. Up to the end of 1813, when he was twenty years of age, he remained on the half-pay list, and was then gazetted to the York Chasseurs. At the age of twenty he became engaged to his future wife, was transferred shortly after to the 4th Battalion Royal Scots, saw a good deal of active service, married on very small means at

the age of 24, threw up the Service about the age of 25, and then, by sheer mental power and force of character, achieved a position as one of the foremost railway engineers of the day. The book well repays perusal.

Cold Steel: a Practical Treatise on the Sabre, also on various other weapons of the present day. By ALFRED HUTTON, late Captain K.D.G. London: Clowes, 1889. Pp. 241. Size $10\frac{1}{2}'' \times 7\frac{1}{2}'' \times 1\frac{1}{4}''$. Weight under 3 lbs. Price 10s. 6d.

This is the work of an enthusiast, for no one but an enthusiast would have given us such a really beautifully got-up book in connection with "Cold Steel." It is most interesting, and the numerous illustrations are excellent.

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Sir Edward Hamley has put forward here in a collected form his views and opinions on this important matter. They should be carefully studied by all interested in the question.

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APPENDIX.

PROCEEDINGS OF THE FIFTY-NINTH ANNIVERSARY MEETING.

THE FIFTY-NINTH ANNIVERSARY MEETING of the Members was held in the Theatre of the Institution, on Saturday, March 1st, 1890, The Right Hon. LORD GEORGE HAMILTON, M.P., First Lord of the Admiralty, in the Chair.

I. The Secretary read the notice convening the Meeting.

II. The Fifty-Ninth Annual Report was read as follows:—

1. The Council have the pleasure of submitting their Report for the year 1889.

MEMBERS.

2. Thirty-five Life Members and One hundred and Thirteen Annual Subscribers, making a total of One hundred and Forty-eight new Members, joined the Institution during the past year. The loss by death amounted to Eighty-four, and Sixty-seven Members withdrew their names.

The names of Twenty-eight Annual Subscribers, whose subscriptions were in arrears for two years, have, in accordance with Section V, par. 6, of the Bye-laws, been struck off the list of Members.

STATEMENT OF CHANGES AMONG THE MEMBERS SINCE 1ST JANUARY, 1889.

			Life.	Annual.	Total.
Members, 1st January, 1889			1,486	2,771	4,257
Number of Members joined during 1889 ..			35	113	148
			1,521	2,884	4,405
Changed from Annual to Life			+ 5	— 5	
			1,526	2,879	
	Life.	Annual.			
Deduct—Deaths during 1889 ..	27	57			
Withdrawals	—	67			
	—	124			
Struck off	—	28			
	27	152	27	152	179
Number on 1st January, 1890			1,499	2,727	4,226

A tabular analysis of the present and past state of the Institution is given in Appendix A.

For detail of Annual Subscribers, see Appendix B.

GENERAL ABSTRACT OF THE ACCOUNTS OF THE ROYAL UNITED SERVICE INSTITUTION, FROM 1ST JANUARY TO 31ST DECEMBER, 1889.

ii PROCEEDINGS OF THE FIFTY-NINTH ANNIVERSARY MEETING.

EXPENDITURE.

	£	s.	d.	£	s.	d.	£	s.	d.
Secretary's Salary...	400	-	-	...	...	...
Librarian's Salary...	210	-	-	...	...	...
Clerk's Salary...	83	7	6	...	...	...
Servants' Wages...	429	3	2	...	...	...
Ditto Clothing...	61	13	6	...	...	...
Insurance...	20	5	-	...	...	...
Ground Rent...	200	7	3	...	...	...
Fuel...	51	1	11	...	...	...
Lighting...	26	2	9	...	...	...
Assessed Taxes...	82	10	2	...	...	...
Rates...	146	8	8	...	...	...
Artificers...	78	13	9	...	...	...
Library (purchase of Books, M. ps., &c.)	126	14	6	...	...	...
Lending Library...	13	18	-	...	...	...
Museum...	25	1	3	...	...	...
Advertisements...	135	1	-	...	...	...
Printing, Stationery, &c.	145	17	-	...	...	...
Journal...	1,362	18	11	...	...	...
Postage { Letters...	38	18	2	...	...	...
{ Journal	253	15	1	...	...	...
House Expenses and Sundries	297	13	3	...	...	...
Go'd Medal	79	1	6	...	...	...
Messrs. Sotheby, Wilkinson, and Hodge (Valuation of Museum and Library)	11	10	-	...	...	...
Preparation of New Catalogue	11	10	-	...	...	...
Cash repaid to Agents	79	10	-	...	...	...
Charges from Agents	13	11	-	...	...	...
For £298 17s. 1d. India 3 per Cent. Stock at 100½	300	-	-	...	...	...
For £494 8s. 3d. India 3 per Cent. Stock at 101	500	-	-	...	...	...
Cash in Bank...	178	13	1	...	...	...
Balance { Cash in hand, Postage Account, Do.	-	8	5	...	...	...
				179	1	6			
				£5,0	2	4			

Examined and found correct—
29th January, 1890.

LIONEL C. DRUMMOND
FREDERICK R. RAFTT.
E. R. WETHERED, Lt.-Col.

Auditors.

JOHN DAY,
Accountant.

£5,072 4 1

FINANCE.

3. An Abstract of the Accounts, duly audited, is given on the opposite page.

ESTIMATE OF RECEIPTS AND EXPENDITURE FOR THE YEAR 1890.

EXPENDITURE. £ s. d.				RECEIPTS. £ s. d.			
Secretary's Salary ..	400	-	-	Cash in Bank ..	178	-	-
Librarian's ..	220	-	-	Annual Subscriptions :			
Clerk's ..	83	-	-	£ s. d.			
Servants' Wages ..	430	-	-	At 10s. ..	108	-	-
" Clothing ..	70	-	-	" £1 ..	2,552	-	-
Insurance ..	20	-	-		2,660	-	-
Ground Rent ..	205	-	-	Entrance ..	150	-	-
Fuel ..	60	-	-	Dividends ..	560	-	-
Lighting ..	30	-	-	Government Grant ..	600	-	-
Taxes ..	90	-	-	Sale of Journals ..	480	-	-
Rates ..	150	-	-	Lending Library ..	30	-	-
Artificers ..	100	-	-				
Museum ..	100	-	-				
Gold Medal ..	12	-	-				
Library ..	200	-	-				
Lending do. ..	20	-	-				
Advertisements ..	140	-	-				
Printing ..	150	-	-				
Journal ..	1,400	-	-				
Postage of Journal ..	260	-	-				
Postage of Letters ..	40	-	-				
House Expenses and Sundries ..	80	-	-				
New Catalogue ..	260	-	-				
Balance ..	138	-	-				
Total ..	£4,658	-	-		£4,658	-	-

LIFE SUBSCRIPTIONS AND CAPITAL ACCOUNT.

4. Life Subscriptions to the amount of £400 have been invested in India 3 per Cent. Stock. In addition, £400 of "Income" have also been invested in India 3 per Cent. Stock. These sums represent £793 5s. 4d. of Stock. The invested property of the Institution is thus raised to £20,498 12s. 8d. (see Appendix C.), of which £15,894 10s. 2d. of stock, is the accumulation of Life Subscriptions, and £4,604 2s. 6d. of stock, the amount placed to the credit of the General Fund.

THE FUTURE LOCALITY OF THE INSTITUTION.

5. The Council regret that they are not in a position to report a definite arrangement respecting the future locality of the Institution. On the 6th January, 1888, and again on the 12th April, 1889, the Council appealed to the Treasury to provide new premises in lieu of those now in occupation, and a Memorial (see Appendix D) was presented to the Chancellor of the Exchequer on the 29th June. To this the Chairman received on the 3rd September last, a provisional reply, in which a promise was given that the subject should receive the early attention of the Chancellor of the Exchequer on his return to London, and the question is at the present time under his consideration.

PAPERS.

6. Papers on the following subjects were read and discussed during the year, and have appeared in the Journal, viz.:—

- CAPTAIN FRANCIS G. STONE, P.S.C., R.A. (Institution Prize Medallist, 1888), on "Quick-firing Guns for Fortress Defence."
- LIEUT. WARREN F. CABORNE, R.N. Reserve, on "The Royal Naval Reserve."
- LIEUT. T. Y. GREET, R.N., on "Coaling Ships."
- MAJOR-GENERAL C. H. OWEN, late R.A., on "The Value of Artillery in the Field."
- JOHN DONALDSON, M.I.C.E. (Messrs. J. I. Thornycroft & Co.), on "The more Recent Improvements in Thornycroft Torpedo Boats."
- THE RIGHT HONOURABLE LORD BRASSEY, K.C.B., on "Our Naval Position and Policy."
- REAR-ADMIRAL P. H. COLOMB, on "The Relations between Local Fortifications and a Moving Navy."
- PRINCIPAL VETERINARY-SURGEON G. FLEMING, C.B., LL.D., on "Forage for Military Purposes."
- VETERINARY-SURGEON E. E. BENNETT, on "The Employment of Dogs for Military Purposes."
- LIEUT.-COLONEL F. W. HADDAN, 4th Volunteer Battalion The Queen's Royal West Surrey Regiment, on "The Home Defence Bill as affecting the Volunteers."
- SURGEON-MAJOR J. L. NOTTER, M.D. (Professor of Hygiene, Army Medical School, Netley), on "The Soldier's Food, with reference to Health and Efficiency for Service."
- W. H. DEERING, F.C.S., F.I.C. (Chief Assistant Chemist, War Department), on "Recent Inventions in Gunpowder and other Explosives."
- LIEUTENANT W. C. CRUTCHLEY, R.N. Reserve, on "The Unprotected State of British Commerce at Sea."
- COLONEL LONSDALE HALE (retired R.E.), on "The recent Changes in the Drill of the German Army."
- MAJOR G. R. WALKER, R.E. (the late), on "Fortifications and Fleets."
- CAPTAIN W. J. ROBERTSON, R.H.A., on "Horse Artillery." Part II.
- LIEUTENANT-COLONEL R. ELIAS, h.p. (late East Lancashire Regiment), on "Lancers and Lances."
- COLONEL A. B. TULLOCH, C.B., h.p. (late the Welsh Regiment), on "Battle Training of Regimental Officers."
- CAPTAIN GERARD H. V. NOEL, R.N. (Gold Medallist, R.U.S.I.), on "The Training of the Executive Branch of the Navy."
- DEPUTY-SURGEON GENERAL W. G. DON, M.D., on "Recruits and Recruiting."
- LIEUTENANT-COLONEL N. L. WALFORD, h.p., R.A., on "The Tactics of Coast Defence."
- STAFF-COMMANDER ETTRICK W. CREAK, R.N., F.R.S., on "The Mariners' Compass in Modern Ships of War."
- PRINCIPAL VETERINARY-SURGEON G. FLEMING, C.B., LL.D., F.R.C.V.S., on "Forage for Military Purposes." Part II.
- MR. JAMES RIGG, C.E., on "The Mechanical Coaling of Steamers."
- C. E. H. CHADWYCKE-HEALEY, Esq., Sub-Lieut., Royal Naval Artillery Volunteers, on "The Naval Volunteers."
- MAJOR ALFRED V. FORDYCE, Commanding 1st Cadet Battalion Royal Warwickshire Regiment, on "The Military Training of Boys."

The thanks of the Institution are due to the authors for the valuable professional information thus afforded.

The theatre was lent to the Tactical Society for two Lectures; to the Metropolitan Volunteer Serjeants' Tactical Association for nine Lectures; and on thirteen other occasions to Societies and Associations connected with the Services, for their meetings.

THE JOURNAL.

7. The sale of the Journal produced £486 as compared with £375 in the previous year.

LIBRARY.

8. The Library now contains 23,046 volumes, of which four hundred and eighty-one have been added since the last Report; of these, eighty-two have been purchased, two hundred and sixty-five presented, and the remainder are bound periodicals, &c.

The new catalogue is nearly completed, and the Council hope that it will be on sale to Members at an early date.

Donations of books and maps have been received from the Governments of Austria, Brazil, Denmark, France, Germany, Italy, the Netherlands, Russia, Spain, Sweden, Switzerland, and the United States.

The thanks of the Council have been conveyed to the several Governments for these donations.

The Institution is indebted to the Lords Commissioners of the Admiralty, to the Secretaries of State for War, and for India, for copies of various works issued by their Departments, and to the Speaker of the House of Commons for Parliamentary Papers.

The exchange of Journals with Foreign Governments and with many Scientific Societies, in this and other countries, has been continued.

A list of the additions to the Library and to the Museum will be published in the "Proceedings" of this day's meeting, and in the Appendix to Vol. XXXIII. of the Journal.

The Lending Library (see Appendix E), available for Members in the United Kingdom, which was opened on the 1st November, 1887, has proved a success, not only financially, but also in increasing the usefulness of the Institution, 137 Subscribers having availed themselves of it since its formation.

PROFESSIONAL INFORMATION.

9. When enquiries on Naval and Military professional subjects are received from Members, endeavours are made either to furnish the information sought for, or to point out where it can be obtained.

MUSEUM.

10. The Council take this opportunity of thanking Messrs. Sir William Armstrong, Mitchell & Co.; the Naval Construction and Armament Co.; Messrs. Robert Napier & Sons; Messrs. Donald Currie & Co.; the Thames Ironworks and Ship-Building Co., for their valuable assistance towards forming a Loan Exhibition of Models of Ships. Such an Exhibition, if generally assisted by those Ship-building firms who have

received orders from H.M.'s Government, would prove of great value and interest to the Members (and also to the public who visit the Institution), and would, to a great extent, obviate the purchase of expensive models, which occupy much space, and which, after a time, become out of date.

AFFILIATION OF THE UNITED SERVICE INSTITUTION OF INDIA WITH THE ROYAL UNITED SERVICE INSTITUTION.

11. The Council recommend that the following proposals for affiliation of the United Service Institution of India with this Institution, which have been on trial for two years, should now become permanent, and be embodied in the bye-laws of this Institution.

Proposals for the Affiliation of the United Service Institution of India with the Royal United Service Institution.

A. Proposed that—

<p>1. Members of the United Service Institution of India proceeding to the United Kingdom on two or three months' "Privilege" leave, or on six months' leave, shall be permitted as "Temporary Members" to attend the Lectures and to use the Reading Room, &c., of the Royal United Service Institution (but not receive the Journal) on payment of a subscription of five (5) shillings.</p>	<p>Temporary Members on "Privilege" leave, 5s. for six months without the Journal.</p>
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2. Should those joining as above obtain an extension of leave, they can extend their "Temporary Membership" on the payment of an additional 5s. for any period not exceeding six months.

<p>3. Members of the United Service Institution of India proceeding to the United Kingdom on "Furlough," or leave exceeding six months, shall be permitted to attend Lectures and use the Reading Room, &c., of the Royal United Service Institution on payment of 10s. per annum. Should they wish also to receive its Journal (which can only be delivered by the Secretary on personal application, or to an authorized agent, without incurring postage charges), an additional annual payment of 10s. will be necessary.</p>	<p>Temporary Members on Furlough, 10s. per annum without, and £1 per annum with, the Journal, on personal application</p>
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4. In the event of Temporary Members, under paragraph 1, obtaining an extension of leave for six months, and wishing also to obtain the Journal, they can do so on payment of fifteen (15) shillings in addition to the five shillings already paid.

5. All the above subscriptions to be paid in advance, and admission as a "Temporary Member" to take place on payment.

6. The above rules will apply to both Life and Annual Members of the United Service Institution of India.

B. Proposed that—

<p>1. Members of the United Service Institution in India, Rs. 5 per annum, and Journal.</p>	<p>Royal United Service Institution shall, throughout their service in India, be entitled to be in all respects (including receipt of Journal without extra payment) Members of the United Service Institution of India on payment of an Annual Subscription of Rs. 5 (in advance).</p>
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C.—

1. Any Member of either Institution will be entitled to obtain the Journal of the other on payment (in advance) at Members' prices.
2. The Secretaries of both Institutions will interchange lists of Members, made up to date, periodically.

CORRESPONDING MEMBERS OF COUNCIL.

12 On the 1st January, 1890, the number of Corresponding Members of Council was 234.

GOLD MEDAL.

13. Six Essays have been received in competition for the Gold Medal, the subject being—

“The Maritime Defence of the United Kingdom (including its Colonies and Dependencies) and its Trade, in a War with a great Maritime Power, showing the fleet considered necessary and its disposition.”

Admiral Sir George Willes, K.C.B., Captain Bedford, C.B., A.D.C., R.N., and Captain Long, A.D.C., R.N., kindly undertook the duties of Referees, and their decision will be made known to this Meeting.

14. SUBJECT FOR THE MILITARY ESSAY FOR THIS YEAR.

“The Tactical Operations of the future (including questions of Supply and Transport of Ammunition), as affected by the introduction of Magazine Rifles, Machine and Quick-firing Guns, and Smokeless Powder.”

The competition is open to Members of the Institution, and to all who are eligible to become Members.

MEMBERS OF COUNCIL.

15. In accordance with the Bye-law passed at the last Annual General Meeting the following Members retire, having served three years on the Council, viz. :—

Rear-Admiral P. H. COLOMB.

Major-General Sir WILLIAM CROSSMAN, K.C.M.G., M.P., late R.E.

Colonel D. MILNE-HOME, late Royal Horse Guards.

The Council submit the names of five Members, from which vacancies may be filled up. The first three on the list are proposed for immediate election, viz. :—

Rear-Admiral P. H. COLOMB .. .. .	..	For re-election.
Colonel G. G. WALKER: in waiting since last Annual Meeting.	}	For immediate election.
Lt.-Colonel N. L. WALFORD, h.p., R.A.		
Major-General E. H. CLIVE.		
Colonel R. N. DAWSON-SCOTT, h.p., R.E.		

CONCLUSION.

In concluding their Report, the Council express their regret that the number of deaths and withdrawals has more than counterbalanced the number of new Members, and that they have had to strike off the names of 28 Members for the non-payment of their subscriptions after repeated applications, thus further reducing the number on the rolls of the Institution.

They cannot but hope, however, that when the question of a new house is favourably settled, a generous support will be given to the Institution, in order to make it more worthy of the Naval and Military Services of the country.

WHITEHALL YARD,
13th February, 1890.

By Order,
B. BURGESS, CAPTAIN,
Secretary.

APPENDIX A.

TABULAR ANALYSIS OF THE STATE OF THE INSTITUTION.

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fees.	Income (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the pur- chase of Books, &c.	No. of Vols. in Library.	No. of Members on the 31st Dec.	Number of Visitors.
	£	£	£	£	£	£			
1831	654	..	654	1,194	..	..	..	1,437	..
1832	1,146	..	1,146	973	..	..	..	2,699	..
1833	1,405	..	1,450	692	..	..	..	3,341	..
1834	1,500	..	1,549	583	1,100	..	..	3,748	13,376
1835	1,480	..	1,574	366	2,430	40	..	4,155	8,537
1836	1,570	..	1,682	330	3,747	45	..	4,069	8,521
1837	1,549	..	1,747	222	4,747	180	..	4,164	10,907
1838	1 462	..	1,634	230	5,500	246	..	4,175	15,788
1839	1,399	..	1,565	168	5,500	292	..	4,186	16,248
1840	1,363	..	1,525	198	5,500	446	5,500	4,257	17,120
1841	1,450	..	1,643	186	6,000	243	5,850	4,243	19,421
1842	1,373	..	1,565	144	6,400	373	6,450	4,127	21,552
1843	1,299	..	1,494	140	6,700	237	7,000	4,078	27,056
1844	1,274	..	1,408	112	3,000	298	7,850	3,968	22,767
1845	1,313	..	1,466	228	1,500	127	8,100	3,988	21,627
1846	1,298	..	1,456	138	1,500	74	8,410	4,031	32,885
1847	1,314	74	1,502	132	1,700	37	..	4,017	38,699
1848	1,175	57	1,375	48	1,700	85	9,641	3,947	37,140
1849	1,176	72	1,375	84	1,150	58	..	3,970	33,333
1850	1,141	106	1,294	198	600	36	..	3,998	33,773
1851	1,136	131	1,292	66	666	34	10,150	3,188	52,173
1852	1,124	133	1,281	114	200	43	10,300	3,078	20,609
1853	1,243	319	1,684	264	528	41	10,420	3,251	25,952
1854	1,200	138	1,368	126	612	95	10,587	3,171	22,661
1855	1,159	107	1,289	120	653	55	10,780	3,131	14,778
1856	1,216	197	1,519	156	761	47	10,832	3,204	16,184
1857	1 258	176	1,937	78	1,038	40	10,960	3,168	12,755
1858	1,318	221	2,102	105	438	31	11,062	3,246	25,747
1859	1,526	195	2,277	512	946	70	11,320	3,344	28,739
1860	1,961	298	3,577	397	2,178	114	11,517	3,518	28,011
1861	2,122	305	2,899	266	2,846	99	11,812	3,689	23,296
1862	2,296	242	3,127	239	3,178	109	12,026	3,797	27,215

APPENDIX A—(continued).

TABULAR ANALYSIS, &c.

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fees.	Income (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the pur- chase of Books, &c.	No. of Vols. in Library.	No. of Members on the 31st Dec.	Number of Visitors.
	£	£	£	£	£	£			
1863	2,379	218	3,100	405	3,583	143	12,296	3,847	18,150
1864	2,425	215	3,253	222	4,516	116	12,700	3,902	17,276
1865	2,435	154	3,467	235	4,804	137	13,000	3,895	18,253
1866	2,435	157	3,488	299	5,486	150	13,337	3,891	17,067
1867	2,431	141	3,467	208	5,732	140	13,800	3,823	17,211
1868	2,446	184	3,534	297	6,396	119	14 100	3,812	16,417
1869	2,368	165	3,485	238	6,653	232	14,660	3,792	15,947
1870	2,376	178	3,493	333	7,313	140	15,055	3,831	18,654
1871	2,455	237	3,677	538	7,748	202	15,501	3,922	19,420
1872	2,620	336	4,111	713	8,927	192	15,761	4,116	19,773
1873	2,776	295	4,316	535	9,465	222	16,227	4,276	18,183
1874	2,819	216	4,491	409	10,189	218	16,624	4,330	16,771
1875	2,801	154	4,595*	469	10,721	228	17,000	4,308	15,960
1876	2,794	162	4,500	437	11,305	171	17,700	4,320	15,543
1877	2,840	218	4,750	526	11,725	217	18,300	4,405	15,682
1878	2,881	231	4,700	459	12,091	231	18,750	4,485	17,881
1879	2,904	180	4,490	407	12,505	254	19,170	4,473	15,529
1880	2,962	255	5,115*	577	12,965	240	19,565	4,531	13,041
1881	2,893	238	4,967	645	13,670	240	19,920	4,577	12,507
1882	2,829	181	4,739	491	14,069	174	20,352	4,591	12,546
1883	2,892	205	5,023	692	15,251	157	20,658	4,627	11,482
1884	2,851	172	4,950	491	16,000	207	20,943	4,613	12,388
1885	2,857	181	5,121	545	16,902	169	21 370	4,377	12,220
1886	2,757	141	4,842	358	17,492	192	21,778	4,368	12,358
1887	2,728	141	4,898	401	18,372	160	22,087	4,280	10,974
1888	2,716	216	5,238*	512	19,705	195	22,565	4,257	14,848
1889	2,663	148	4,874	375	20,498	140	23,046	4,226	13,333

* A legacy of £100 was received this year.

APPENDIX B.

DETAIL OF ANNUAL SUBSCRIBERS

1889.

Paid for 1889 @ £1	2,529
„ „ „ „ 10s.....	212
„ in 1888 for 1889	10
New Members who joined between October and December, 1888	43
Deaths, and withdrawals of Members whose subscriptions for 1889 have not been paid	36
Members two years in arrears with their subscriptions.....	28
Do. in arrears for 1889	26
	<hr/>
	2,884.
Deduct, Annual to Life.....	5
	<hr/>
	2,879
„ Deaths and withdrawals	124
	<hr/>
	2,755
„ Struck off for non-payment, in accordance with Section V, para. 6, of the Byelaws.....	28
	<hr/>
Total number of Annual Subscribers, 1st January, 1890 ..	<u>2,727</u>

JOHN DAY,
Accountant.

Examined and found Correct—	LIONEL C. DRUMMOND.	} Auditors.
29th January, 1890.	ERNEST R. RAITT.	
	E. R. WETHERED, Lt.-Col.	

APPENDIX C.

CAPITAL ACCOUNT.

Stock.

	£	s.	d.
Consols	16,343	16	9
India $3\frac{1}{2}\%$..	2,028	17	8
India 3%	1,816	5	2
Nottingham Corpn. 3% ..	369	13	1
	<hr/>		
	£20,498	12	8

APPENDIX D.

To the Right Honourable G. J. Goschen, M.P., Chancellor of the Exchequer.

MEMORIAL from H.R.H. the President, Vice-Presidents, Council, and Members of the Royal United Service Institution.

1. Your Memorialists desire to bring to your notice the present position of the Royal United Service Institution.

2. The Institution occupies two houses, which are the property of the Crown, the one in Whitehall Yard, for which a rent of £205 is paid, and the other in Scotland Yard, which is rent-free. These premises may have to be surrendered to the Government at any time, as regards part at will, and as regards the remainder at three months' notice.

3. In contemplation of this contingency, the Treasury intimated its willingness to pay the ground-rent of a suitable site for the Institution, less the rent of £205 now paid to the Government, on the condition that the cost of erecting the new building should be defrayed by the Institution.

4. On the assumption that the present site shall be retained, the ground-rent, calculated on the current market value of the land in the locality, would be, in round numbers, £1,300, and deducting from this sum £200, the amount of rent, there would remain £1,100, as the annual contribution of the Treasury towards the ground-rent. If to this last sum £600, the annual subvention of the War Office and the Admiralty, is added, the amount of £1,700 will be arrived at as the sum to which the Government will stand pledged in the event of the above-mentioned undertaking on the part of the Treasury being carried out.

5. In this case the responsibility of providing the new building would rest upon the Institution; but its funds have been shown, in recent correspondence, to be insufficient to meet such an obligation, and it is, therefore, necessary that some other arrangement should be made.

6. In this view it is now suggested that the Government should construct the new building and grant the free use of it to the Institution, whilst retaining in its own hands the full rights of ownership.

7. The yearly expense of this scheme to the Government would be: (1) £900, the interest of the cost of the new building, estimated at £30,000; (2) £1,300, the ground-rent of the site, which would be foregone; (3) £600, the annual subvention of the War Office and the Admiralty, making a total of £2,800. But, on the other hand, the Institution, when placed in possession of accommodation suited to its requirements, might reasonably anticipate increased subscriptions from the Services, and, if these were forthcoming, the necessity for an annual subvention might possibly cease, and then the annual charge on the public finances would be decreased to £2,200, or not more than £500 in excess of the cost of the arrangement to which the Treasury is committed.

8. It should be further borne in mind—1st, That the extent of the Government assistance, which this scheme contemplates, would not really be greater than that which the Institution has received for several years past, namely, free accommodation and a small money grant; 2nd, That the following Societies: the Royal Society, the Society of Antiquaries, the Linnean Society, the Chemical Society, the Royal Academy of Arts, the Geological Society, and the Royal Astronomical Society, when displaced from Somerset House, owing to the premises being otherwise appropriated, had free accommodation provided for them by the Government, and it is contended that they had not greater claims for consideration than the Royal United Service Institution.

9. It remains to be stated that the Managing Committee of the Royal Engineers' Institute have intimated their desire that, when a new house is built for the Royal United Service Institution, it should be sufficiently large to accommodate their Head-quarters Library, the books of which are now scattered through several rooms and passages of the War Office, in which about 2,000 square feet of wall space are thus occupied—a most inconvenient arrangement, from whatever point it

may be regarded. This proposal has been favourably entertained by the Council, who are of opinion that many advantages would accrue from the Library of the Royal Engineers' Institute being under the same roof as the Royal United Service Institution, and the scheme has since been approved by His Royal Highness the Colonel-in-Chief of the Royal Engineers.

10. Your Memorialists are aware that there may be difficulties in the way of providing a new building for the Royal United Service Institution; but, if such be the case, they have no hesitation in urging the Government to give an official promise that on resuming possession of the present premises it will find for the Institution other accommodation, rent-free, on a suitable site. A definite assurance to this effect would in some measure relieve the Institution from the injurious results of the present uncertainty of its position, and enable it to appeal with some prospect of success to the Naval and Military Services for the amount of support to which it may fairly be considered entitled, but which they now withhold from it, owing to the unfortunate circumstances in which it is placed.

11. This would, of course, effect no little improvement in the present state of affairs, but your Memorialists, while admitting this, consider themselves bound to represent that the work of the Institution is seriously impeded by the very dilapidated condition of the two houses which it occupies, and by the insufficiency of the accommodation which they afford. The exhibits of the Museum and the books of the Library have increased of late years to such an extent that proper space cannot be found for them, and the interest now taken by the public in the discussions periodically carried on, attracts to the Lecture Theatre numbers for which it is often difficult to provide.

12. It is thus clear that more commodious premises than those which the Institution now holds are urgently required, if its past sphere of usefulness is to remain unimpaired. To that usefulness, as appears from the records of the Institution, frequent and very strong testimony has been borne, not only by Naval and Military Officers of high rank and great experience, but also by Statesmen who have filled the most important offices in the government of the Empire, so that it is not necessary to lay further stress on that point on the present occasion, the more especially as you, Sir, when at the head of the Naval Administration of this country, must have had many opportunities of observing what the Institution has already done for the improvement of the Army and the Navy, and of judging how much more may be expected from it when it shall have been placed on a satisfactory footing in regard to accommodation.

(Signed)

GEORGE,
President.

Royal United Service Institution,
Whitehall Yard,
29th June, 1889.

APPENDIX E.

RULES FOR THE GUIDANCE OF MEMBERS BORROWING BOOKS FROM THE LIBRARY.

The Rules of the Library, dated 6th July, 1887, are hereby cancelled, and the following are substituted to take effect from this date.

1. Any Member in the United Kingdom, and who is not in arrears of his Subscription, shall, on payment in advance of 10s. for twelve months from date of payment, be permitted to borrow books from the Library subject to the following Regulations.
2. The above Rule will not, as regards payment, apply to Officers employed in the War Office, Admiralty, India, Colonial, and Foreign Offices, who may desire works from the Library to assist them in their professional duties
3. All charges for the transmission of books, from or to the Institution, shall be paid by the Members borrowing.
4. Books which cannot be replaced, and those of great value and rarity, are not to be issued on loan, neither are Books of Reference, Atlases, Maps and Charts.
5. A Member borrowing a book from the Library shall be responsible to the Institution for its safety and good condition from the time of its leaving the Institution, until it is received back by the Librarian: in case of loss, damage or defacement by marking or in any other way, he shall replace the same, or make it good, or shall furnish another copy, or pay the value of the entire work of which it may be a part, as may be directed by the Council.
6. Members borrowing books are not privileged to lend them.
7. The number of Volumes at any one time issued to a Member shall not exceed four; this will not include Maps issued with the Volumes.
8. Books borrowed from the Library are not to be detained longer than one month.
But should a work be applied for by a Member for a longer period the Librarian is authorised to extend the period of issue to a second month and subsequently to a third, provided the work is not required by another Member; after the third month the return of the work is compulsory.
9. Non-compliance with any of the above Rules will render a Member liable to the forfeiture of the privilege of borrowing books.

By order of the Council,

JOHN DAY,
Librarian.

ROYAL UNITED SERVICE INSTITUTION,
6th November, 1889.

General GEORGE ERSKINE :—

My Lord,—Perhaps before you proceed to deal with the several resolutions which you have on the Agenda paper, you will allow me, as Chairman of the Council, to say a few words supplementary to the Report which we have just heard read. I think it would be fitting in me, as a preface to what I have to say, to give expression to the thankfulness which my colleagues and myself feel, that we have had no accident to life or limb from the delapidated state of the building in which we have had to carry on our work. How long this immunity may last, I am not prepared to say. I can only hope that there will be no serious disaster before we emerge from this tenement into a better one, but when will that be? That is a question which is exercising, and has long exercised, the minds of all the friends of the Institution, but I am sorry to say that the Council cannot yet give any definite answer to it. At any rate, I can give this meeting, with your permission, a few details of what has been done, during the last year, with regard to the future of the Institution. We occupy two houses, both which are the property of the Crown, and in both we are tenants at will. One house is rent free, for the other we pay £205 a year as rent; but on the other hand, the Government give us an annual subvention of £600. Therefore, to put the matter shortly, we have at the present time free accommodation, and an allowance of £395 a year. I have said that we are tenants at will, and from time to time we have had notice to quit. At the present time we are in that predicament, but in view of our having to turn out from our present premises, the Treasury, some time ago, promised that they would pay the ground rent of a suitable site for the Institution, with a proviso that the Institution should build the house that would be required. Some time ago—only a few years ago—a strict scrutiny of the finances of the Institution showed very clearly that we were not in a position to do that, and accordingly, on the 6th of January, 1888, the Council decided that a letter should be written to the Treasury, explaining that fact and asking the Government to build the house for us when we should have to vacate these premises. No notice was taken of that letter, and in consequence we repeated the application on the 12th of April last year. That did not seem to produce any effect, and accordingly we memorialised the Chancellor of the Exchequer, on the 29th of June last. It was intended, at first, that we should present the memorial by means of a deputation, but the Chancellor of the Exchequer demurred to that course, and it was not taken. The memorial, however, was supported by a large and influential number of members of Parliament; they took the case up very warmly. They held two meetings with a view to giving expression to what they thought on the subject, and the second meeting was attended by Mr. Stanhope, the Secretary of State for War, and yourself, my Lord, as First Lord of the Admiralty, and I believe I am right in saying that Mr. Stanhope and yourself promised to represent the claims of the Institution in the strongest way to the Chancellor of the Exchequer. The press also took up the cause of the Institution on that occasion, and several of the leading journals wrote very strong in its behalf. While all this was going on, the end of the Parliamentary session approached, and we all know what that means with regard to the work of the Ministers of the Crown. Mr. Goschen was sorely pressed with his work, and on the 3rd of September he, through his private secretary, addressed a letter to me, as Chairman of the Council, to say that he could not possibly take up the application contained in the memorial until after the vacation. Of course, a considerable delay ensued and the next event that I have to speak of, is an interview which I had with Sir Reginald Welby, whom I think, I may describe correctly as the permanent head of the Treasury. He had had the question of the Institution deputed to him by the Chancellor of the Exchequer, and he desired to have an interview with me on the subject, so that we might discuss the matter. We went into the question very fully. Of course I need not tell my colleagues on the Council that I pressed the claims of the Institution in the strongest way I possibly could, and I flatter myself that I made some impression on Sir Reginald Welby. I do not mean to say that I convinced him. He is much too good an official to confess that that was the case. However, he promised to represent what I had said to the Chancellor of the Exchequer, who at that time was in the country, and

he said that the next step would be to call upon the Office of Works, to report to the Treasury regarding the sites that would be available for the Institution, and also with regard to the cost of a new building. I have been made aware that that Report has been rendered to the Treasury, so that I presume that the Chancellor of the Exchequer has before him at the present time all the information which he requires. It may appear, perhaps, that the Council has been rather importunate in their dealings with the Treasury, but I do not think that we need to make any apology on that account. We are not pressing our individual claims in matters of personal interest, but advocating the cause of an Institution which has proved itself of the very greatest utility to the two Services—the Army and the Navy—and not only that, but which has shown itself one of national importance. The fact is that our records teem with testimonials to that effect, not only from naval and military officers of distinction, but also from ministers of the Crown and statesmen of all shades of politics, and even from men of science and inventors. I have said that we have asked the Government to build us a new house when we have to turn out of the present premises, but that is not, I think, quite so great a demand as it would at first sight appear, because the property will not be handed over to the Institution. We should remain in the new house, according to the proposal of the memorial, as tenants at will, so that if the Government should wish to turn us out at any time, they would have the power to do it. We merely request that they will continue to us the same assistance as they have rendered up to the present time, that is, free accommodation, which was given to seven other institutions, which I need not name just now, when they were turned out of Somerset House. The Government on that occasion provided for those societies free accommodation, as they had previously to that change. I happen to know that this question of eviction is cropping up again. We have been long threatened, but every year, of course, brings us nearer to the final catastrophe; and I would ask, what is to be done when that event comes? If we are deprived of this house, we shall require another. We have already shown that our finances do not admit of our building a house. Then, will the Government do it for us? That remains to be seen. I am quite sure of this, that if the Government proposes to do so, the necessary expenditure will be cheerfully voted in Parliament, and the action of Parliament in that direction will be cordially endorsed by public opinion. Therefore, I think, we have some reason to hope that our memorial will meet with the success which we think it deserves. I have no more to say on that subject, and I will not detain you more than a minute by mentioning two matters which are of less importance, but still deserve to be brought before the meeting. One is that the Council, during the last year, have made arrangements for providing members in the Institution with light refreshments, so that they will have food for the body here, as well as food for the mind. The next is that Council are considering, whether it is possible to re-arrange the contents of our museum in such a way as to procure more accommodation for the members who visit the Institution. It is not an easy matter to do that in the premises which we now occupy, but we hope that it will be effected; and if so, those gentlemen who find that they can prosecute their studies more effectually when they have the use of tobacco than without it, will be able to have their cigar, or, perhaps, a pipe, without incommoding anyone who objects to smoking. My Lord, I have nothing further to say.

Admiral Sir RICHARD V. HAMILTON:—

My Lords and Gentlemen,—It gives me very great pleasure to propose the first resolution, namely, “That the Report, now read, be adopted, and printed for circulation among the members.” The Report is so satisfactory that it speaks for itself, and, therefore, it is quite unnecessary for me to say much on the subject. I would first like to call your attention to the satisfactory character of the finances. We have increased our investments. If there is anything to soften the hard hearts of the Treasury, I think it ought to be the knowledge that in that respect we are all right. The subjects discussed during the last years have been very equally divided over the branches of the Service, and I am very glad to see amongst the eight naval subjects that have been discussed, several have been brought forward

by officers of the Reserve Forces, showing the interest that they take in these questions. The additions to the library are most satisfactory. With regard to the Lending Library, I can myself testify to the benefit that I have derived from it during the last year, and I hope next year the finances will be in a more satisfactory state than they are now. The new system of giving professional assistance to officers of the Army and Navy has also been very beneficial, and there is no doubt about the very great value of the naval models that have been added to the Museum during the year, and I hope the Council will take steps to increase their number. I beg to move the resolution.

General Sir BEAUCHAMP WALKER :—

My Lords and Gentlemen,—In rising to second the adoption of the Report, I have really little or nothing to add to the very able *précis* which the Chairman has given of the most important subject under our consideration, which is the provision of a new building. I am sorry to say—for the first time since I have been a member of the Council, now eleven years—there has been a very strong difference of opinion as to the mode which should be adopted in bringing this question to the knowledge and the consideration of the Chancellor of the Exchequer, but I for one, as voting in the majority, entirely supported the proposal to leave this most delicate matter in the hands of our Chairman. I can only say, speaking my own opinion, that I do not think the tact and the discretion with which our Chairman has conducted the business, could possibly have been surpassed. Admiral Hamilton has adverted to the points which he considered worthy of remark, and he has left me little further to say on the subject. I should, with him, wish to recommend to the officers of the Services the use of our Lending Library. It was an admirable system when introduced, and I hope that when the next report is read to an audience in this theatre, we shall find that the number of members who have made use of it, has been very largely increased. I have, therefore, pleasure in seconding the proposal that “the Report, now read, be adopted, and printed for circulation among the members.”

Colonel LONSDALE HALE :—

Lord George Hamilton and Gentlemen,—I rise on the present occasion to offer some remarks with regard to the Institution and the Report, and before I do so allow me to mention some of my claims for venturing to trespass upon your Lordship's attention, and upon the attention of gentlemen here present. For seven years I have had the honour of being a member of the Council, and I am still a member of the Council, and, therefore, I ought to know something about the working of this Institution. I ought to know and to be able to distinguish between the difficulties which lie in the way of our progress and which can be overcome, and those which cannot be overcome. Then, again, for nearly double that time I have been able to give a considerable amount of time and labour to the Journal, as the Honorary Editor of the “Occasional Notes.” I have also, I believe, brought about fifty fresh members to this Institution. I merely mention these facts, gentlemen, to show that anything that I may say that may go against the speeches we have just heard, and which may be apparently in opposition to the majority of the Council, is not in the nature of factious opposition, and that I have done my best for many years in the interests of the Institution. Now, Sir, I have been taken by surprise by the departure from precedent which has been initiated by my friend, General Erskine, on the present occasion. Hitherto we have always had the motion for the Report proposed and seconded, and then the discussion took place, but on this occasion, prior to the proposal for the adoption of the Report, the Chairman not only has intervened, but he has told us a great deal which is not in the Report at all. He has given himself an addendum to the Report, and if we, the minority of the Council, had known that this was to take place, then perhaps we should have come prepared to meet him, because, as both General Erskine and Sir Beauchamp Walker would admit, his remarks refer to the very subjects upon which there was a very warm and strongly expressed diversity of opinion in the Council, and I am afraid that in the course of my observations I shall have to take exception to the view of

what has happened, as expressed, perhaps, by those two distinguished officers. But, however, we will leave that for the present, and I may say further that I am one of the firmest believers, perhaps over-sanguine, in the potentialities of this Institution. I believe that the powers of rendering service, not only to the Army and Navy, but also to the nation at large, which this Institution possesses, are enormous, but unfortunately they are latent, they are not being exercised. I also am aware that there is throughout, not only both Services, but in the country generally, a very strong feeling in favour of supporting this Institution to the very utmost, but I also know that there is in the Army, at all events, a deep and growing dissatisfaction with the way in which this Institution carries on its work. Gentlemen, I am afraid I cannot impress my colleagues on the Council with that fact, and they think that I am somewhat drawing on my imagination in this matter, but I know that there are two members of the Council here who are on the Active List, and not on the Retired List, as so many of us on the Council are, and I hope that they will bear me out in saying that the Services at large are dissatisfied with our present position of what I may call cataleptic inertia. The Army believes a great deal more might be done in some way or other, and they are waiting to see us do it. Now, gentlemen, we are really in a very grave crisis of our affairs. We are going to the Government for help, and let us see when the Government call for the Report, as they naturally do, what sort of Institution it is that they have to help. They look at the Report, and they find that first of all it is stated that there is a loss this year of between twenty and thirty members. Well, we are liable to fluctuation, and if it was only one year it would not matter, but if you look back at the Reports from 1882, I think you will find we have been steadily going down in spite of the good feeling which is entertained for us by the Services. And then there is a more astounding fact still. If you look back to 1841, you will find that our numbers at the present time are nearly identically the same as the numbers in the year 1841—fifty years ago, and that notwithstanding the enormous increase in interest which is taken now-a-days in professional matters, by both the Army and Navy, notwithstanding the enormous number of possible subscribers to the Institution which has been created by the institution of the Volunteer Force. Although our percentage in 1841 may have been a satisfactory one as to the percentage of actual subscribers and possible subscribers, the percentage now must be deemed to be of a most unsatisfactory character, seeing that we have made not one step in the way of progress since 1841. Then, with regard to the museum, about which we have heard so much, and which has been valued lately at some fabulous price, I find even that is ceasing to attract. The number of people who came to see it during the last year was 13,000, and there are only ten years out of the whole fifty in which so few have been to see it. The fact is it is a museum of antiquities. Instead of having here only things which are applicable to the present day, which members of the Volunteer, the Militia, and the Regular Forces could see, without going to Chatham and elsewhere; we have nothing but simply military antiquities, and then we expect the Services to support us.¹ But, Gentlemen, there is a far more serious matter which I wish to bring to your notice. There is an item in the Report, that those who do not know this Institution, might read with the deepest satisfaction, but which is to my mind indicative of very serious danger to us. It is stated that the sales of the Journal to the general public have increased from something like £375 to £460, or something of the kind. The Secretary was good enough to give me a list of sales to the general public during the last ten years. I do not know whether they began before that time or not, but at all events, ten years ago, the public demanded £152 worth of Journals for their satisfaction. This last year was exceptional, owing to there being four issues, but year after year has the demand for the Journal risen, until now it comes to nearly £500. Why is that? I know the military literature of Europe pretty well, and there is not a single Journal in the whole of Europe which can touch our own, with regard to its value and excellence. There is no Journal in the

¹ I feel that I have expressed myself too strongly as regards the contents of the Museum, as there are certainly in it some models and weapons of the present day, but to my mind not half enough.—L. H.

whole of Europe which gives lectures of such fairly average quality, and such valuable discussions, and with regard to that small portion that I have to deal with, the "Occasional Notes," it is absolutely the only medium between the Army and Navy, and the literature of foreign countries. Now, under these circumstances, the value of the Journal is being daily more and more appreciated; more and more people are buying it, but they do not join the Institution. People can buy the Journal without joining the Institution. They recognise the value of this Institution as a great publishing company and nothing more, and they will not join it as long as they get the Journal, because, as a brother officer of mine expressed it, they do not see what on earth they will get out of the Institution by joining it, when they can buy the Journal elsewhere. There is another point which has not been mentioned in any of the previous Reports, and which I am specially anxious to bring to your attention. There is an institute, a somewhat one similar to this, known as the Royal Engineer Institute, at Chatham. It is an Institution similar to this, belonging to the Corps of Engineers. Now, although I am an Engineer myself, I may be allowed to say that the Royal Engineers have a certain amount of influence. They have ramifications all over the place, and they have, as I say, a certain amount of active influence in different Government departments and elsewhere. This Institute issue their publications in a most admirable and economical manner. Two years ago, in this theatre, at their Corps' meeting, they expressed a desire to establish in London a branch of that Institute. I thought it was a grand opportunity for the United Service Institution, and I got up myself and proposed to my brother officers that instead of looking for buildings elsewhere they should see whether they could not in some way affiliate with us. They at once joined with the proposal, and I immediately afterwards brought it before the Council. It was very kindly received by my colleagues, but I do not think any of them appreciated as I did the value of getting the Engineers under the same roof with us. The general proposition of the Engineers was roughly speaking this :—They offered us a large sum of money, coming to four figures. They said "All we want to do is to get storage for our professional library; give us a storage for the library and all your members shall be free to go in and make use of it, but our members shall not use your Institution unless they belong to it." I say you could not have a more generous or liberal offer than that. Last year, when the Corps met again, I had to tell them that this site question was still unsettled. Next June they meet again, and then (for I do not think they will wait much longer) I shall have to bring before them the fact that nothing is settled. They will very likely go adrift, and we shall lose the co-operation of that Institute. I merely mention these facts to show you the crisis in which we are. Now, from the Report, gentlemen, in spite of what the Chairman says, I put it to you, are we one atom nearer to getting a site than we were before? These personal interviews which the Chairman of the Council has spoken of, are excellent in their way, and I quite agree with what Sir Beauchamp Walker has said with regard to the admirable judgment which the Chairman displays in these matters, but I do not believe in personal interviews myself. And there is another thing I do not believe in which has been laid stress on, I do not believe in members of Parliament. Great stress was laid in our Council meetings upon the enormous value of the meeting which took place between your Lordship and Mr. Stanhope, and the Army and Navy Committee of the House of Commons, and we were told that immense things would result very likely from that. Let us look at it from a commonsense point of view. On that Committee were two men, whom I take as the antipodes of each other in politics. Both belong to this Institution—Sir William Crossman and Sir John Colomb. Now, do we suppose that Sir John Colomb will refuse his support to the Conservative ministry, or that Sir William Crossman would give a vote of confidence in the ministry, on account of their not giving support to our Institution? The assistance of a Parliamentary Committee is nothing at all; we are bound to stand on our own ground.

The CHAIRMAN :—

I do not wish to interrupt Colonel Hale in any remarks he may make in criticising the Report, but I am bound to say, it seems to me, that the great mass of his

observations have nothing to do with the Report. The Report seems to me to be a very plain statement of facts, and the sketch that was made by the Chairman of the Council is simply a statement of the proceedings which he and the Council have taken during the past year for the purpose of bringing the claims of this Institution before the Treasury. No doubt the Annual Meeting is a favourable opportunity for discussing principles, but I think it is generally the custom to give notice of any question of importance which is outside the Report, and which is intended to be raised. I do not wish to curtail, unduly, Colonel Hale's speech, but I am bound to say that he seems to me to be going into a mass of matters that are scarcely germane to the Report, and if he does that, it is clear that those who differ from him will claim the liberty to follow him. Under these circumstances, I think you will see the expediency of strictly confining what is said to the actual contents and statements in the Report.

Colonel LONSDALE HALE:—

I accept your Lordship's correction with the greatest pleasure, only I may beg to say that I was not the original offender. The Chairman of the Council has touched upon very controversial matter, which has been brought forward, and my colleagues in the Council will remember when that was brought forward, and I did not expect him —

General ERSKINE:—

I do not know what you refer to.

Colonel LONSDALE HALE:—

I refer to one statement about the demur of the Chancellor of the Exchequer to receive a deputation which has been interpreted in different ways, and Sir Beauchamp Walker raised the question about the deputation, which was a subject of very fiery comment between us in the Council. I do not want to go into these questions, I merely explain why I touched upon them.

The CHAIRMAN:—

I am bound to say, that if I thought the Chairman of the Council was going to introduce any matter extraneous or outside the Report, I should have felt it my duty to interrupt him, but in listening to him he seemed to give a careful chronological statement of the steps taken by the Council during the past year to lay their case before the Treasury. If, incidentally, he touched upon any controversial matter, I think he did so in such a way as not to provoke discussion, and I think it will be very advisable in discussing this Report, as I said before, strictly to confine ourselves to the facts recorded within it.

Colonel LONSDALE HALE:—

I will not trespass upon your ruling. I must say this, with regard to the whole proceedings of the Council for the past year, that I have been in an absolute minority, but I am rather proud of that, considering who the other members of the minority are. It has sometimes been a minority of seven, sometimes of three, and sometimes of one. I might bring these matters before this meeting now, but I do not intend to do so. I purposely did not come to raise discussion, but merely to bring before you, as I have tried to do, the grave position in which we are at present. I do not wish to bring it before you now, for the reason that this is not a representative meeting of the Institution. It is one of the regular formal meetings; no notice has been given of any discussion to be raised upon this grave question, and therefore that question had better be deferred until we get a really representative meeting. I merely will say, and I really am driven into doing so, that I utterly dissent from the proceedings of the Council during the past year. My belief is that, with a more active and energetic management, we might do, even with the present site, a great deal more than we do. My feeling is that the Council have gone absolutely the wrong way to work in confining their endeavours to obtain a site merely to writing letters to

officials, and I beg to give notice that in order to have this question properly discussed, I intend at the next meeting of the Council, on Tuesday, to ask them to call a special general meeting of the subscribers to the Institution on some day after Easter, when those members can attend who are not here at present, members from Aldershot, from Chatham, from the Navy, and elsewhere. If the Council decline to accept my request, then I have not the slightest doubt that I shall be able to get 24 members to summon a general meeting, where the members will express far more strongly and openly than I have done this afternoon, what they think of the present and future of the Institution.

General PHILIP SMITH :—

We owe Colonel Hale a good deal for having confirmed Sir Beauchamp Walker's statement that we are not all agreed on the Council. I think my brother officers will be extremely happy to hear that everything in the Council is not immediately agreed upon, but that we have discussions, and sometimes very warm discussions. If we had not, things, perhaps, would not go on so well. Colonel Lonsdale Hale has spoken of the opinion of the Army. I think there is a very strong feeling in the Army that we are not going on as fast as we ought to do. Whether that is true, I do not know; I have my own private opinion upon it. At any rate, I consider that the number of those who have withdrawn their names shows that that feeling exists. Instead of officers withdrawing their names, we ought every year to have a large number joining us in addition. There are numbers of Reserve officers, who might not only leave their names on the books, but also induce others to join. Then we have a very large number of Volunteer officers who are eligible, and who ought also to belong to us. I think that there are certain things in the Report which none of us can call satisfactory. Some have been mentioned, and there are others also which are not what they might be.

Admiral COLOMB :—

I have once or twice been in the minority with Colonel Hale, and I should like on that account to express my disagreement with the line which he has taken on this occasion. I do not think that this is the proper occasion on which to advert to differences on the Council. There have been those differences, and we ought to have them if we are a working Council, but I would ask you, my Lord, to lay to heart the matter, which it seems to me Colonel Hale's speech has brought out, that is, simply that an institution under notice to quit, cannot by any possibility put out its full strength.

The Resolution was then put from the Chair, and declared carried by a large majority.

Colonel TRACEY :—

My Lord,—In moving the Second Resolution, I have been requested by those interested, to testify to the great service this theatre has been, not only to the Services, but to the Auxiliary Forces. The Home Counties Volunteer Forces Institution will hold a meeting here for lecture and discussion one day next week. Very lately Colonel Lonsdale Hale has given a series of most excellent lectures in this theatre to the members of the Home District Tactical Association. I allude to no later date than yesterday, when the usual professional lecture was given at 3 o'clock. At 5.30, this meeting was followed by a largely attended lecture in this theatre to the members of the Home District Tactical Association. Again, later on in the evening, at 8.30, I had the pleasure of being present at a lecture given by Captain Gall, on military bridges, to the Metropolitan Volunteer Serjeants' Tactical Association. Each of these lectures was largely attended, and by almost entirely a different audience. I doubt whether in the history of this Institution there has ever been a larger number of people attending its theatre in one day than there were yesterday. However dilapidated the state of the theatre may be from the builder's point of view, to which the Chairman of the Council has alluded, I do not think the Institution is at all dilapidated in the appreciation of the Services, or in that of the

military public. I beg to move "That the thanks of this meeting be given to those members of the Council who retire by rotation, and that the following members be elected to fill the vacancies, viz. :—Rear-Admiral P. H. Colomb, Colonel G. G. Walker, and Lieut.-Col. N. L. Walford, R.A., for immediate election, and that the following names of members be adopted from which to select in cases of vacancy occurring in the Council, viz. :—Major-General E. H. Clive and Colonel R. N. Dawson-Scott, R.E."

Captain POE, R.N. :—

I beg to second the resolution so ably proposed by Colonel Stracey. On the part of the Navy I can confirm all that he has said as to the advantages offered by this Institution. I think that in the Navy the younger officers are joining more and more every year; we all try to get them to join, and I am sure they benefit themselves and the Service very largely by joining.

The Resolution having been put from the Chair, was unanimously adopted.

Admiral Sir HOUSTON STEWART :—

My Lord, when I endeavoured to find refuge in this dilapidated building from the snow outside, I was surprised to find that I was connected with the honour of proposing a Resolution, and I am happy to say it is a Resolution on which I am sure the feeling will be so unanimous, that there will be no opening for discussion. The Chairman of the Council, in his very clear and able address, has given us a proof of the great value of a sound and healthy system of examination into finances. If it had not been for that examination, this Institution might have launched out into great expenditure which it could not have afforded. It is not necessary, in meetings of naval and military officers, to say that no undertaking or no Institution can be conducted on proper principles unless it is on a sound and healthy system of finance. You cannot ascertain whether that system is sound and healthy unless you have an intelligent and an independent audit, and therefore I venture to think that the Resolution which I have to propose, giving thanks to those gentlemen who gratuitously give their services to auditing the accounts of this Institution, is one of which you will unanimously approve. My Lord, I venture to propose "That the thanks of this meeting be given to the auditors, Lionel C. Drummond, Esq., E. R. Raitt, Esq., and Lieut.-Colonel Wethered, for their valuable services, and that Lionel C. Drummond, Esq., who goes out by rotation, be re-elected for the ensuing year."

Lt.-Colonel BAYLIS, Q.C. :—

My Lords and Gentlemen,—It is with great pleasure that I am called upon to second this Resolution. We are much indebted to the auditors for the great care and trouble they have taken; but, if you will allow me to add one word as a member of the Finance Committee—I never saw accounts better kept. I think we are very much indebted to Colonel Day for the manner in which those accounts have been kept; so accurately, intelligibly, and carefully, that they will bear any inspection, and undergo any supervision that may be necessary. I think I am bound to mention his name in connection with this matter.

The Resolution having been put from the Chair, was unanimously adopted.

The Secretary then read the Report of the Referees on the Naval Essays, from which it appeared that the Gold Medal was unanimously awarded to Captain Henry F. Cleveland, R.N., and that the Essay by Lieutenant Bradford, H.M.S. *Mutine*, was recommended to be printed in the Journal.

General Sir ROBERT HUME :—

My Lords, Ladies, and Gentlemen,—I have the honour to propose to you the following resolution, “That a vote of thanks be given to the Referees, Admiral Sir George Willes, K.C.B., Captain Bedford, C.B., A.D.C., R.N., and Captain Long, A.D.C., R.N., for their valuable services in adjudicating on the Naval Prize Essay.” I am sure, gentlemen, all the members of this Institution must feel very grateful to the gallant officers who have so kindly undertaken the duty of Referees in this matter. It is a duty which, to a certain extent, may be called invidious and thankless, but I hope we shall make up by our cordial thanks to those gallant officers for the way in which they have done their work, and for the thanklessness of the work which they have had to do.

Admiral BOWDEN SMITH :—

My Lord,—I have great pleasure in seconding that Resolution.

The Resolution having been put from the Chair was unanimously adopted.

Admiral Sir GEORGE WILLES :—

On the part of myself and my colleagues, Captain Bedford and Captain Long, I beg to return you our thanks for the cordial vote of the meeting. Unfortunately, I am an idle man, and was only too glad to be one of the Referees. I must say I should rather have wished that some of the essays were not quite so long-winded, but I am very glad the Gold Medal has fallen to Captain Cleveland.

Admiral Sir ERASMUS OMMANNEY, C.B., F.R.S. :—

The Resolution which I have the honour to submit for your approval is as follows :—“That Section I, paragraph 3 of the Bye-Laws be altered as follows : viz., (3) Vice-Patrons :—Members of the Royal Family, distinguished officers, eminent persons who shall have promoted and advanced naval and military science and literature, and others who have been benefactors to the Institution, to be selected by the Council.” With regard to the honour we confer of being Vice-Patrons of this Institution, doubtless you will perceive that those Vice-Patrons are Her Majesty’s Ministers and other eminent functionaries of the Government. The permanent members are confined to Field-M Marshals and Admirals of the Fleet. The Council have taken this into consideration, and with reference to the Charter under which the Institution is incorporated, they are desirous to add to the representation of Vice-Patrons, distinguished men of science, and other men of eminence. A few of such men will be proposed to be selected to add to the number, and their selection, I think, will enhance the merits of the Institution out of doors, and will meet with the approbation of the members in general. It is, I think, only following the example of many other institutions of a similar nature where we generally select people who are eminent, and who have rendered distinguished services to their institutions. In our Charter it is said we shall “sedulously encourage and extend naval and military literature,” and then “that it would further tend to the promotion and advancement of naval and military science and literature” if the Charter were granted. I think we shall have no difficulty in finding members amongst the institutions who would be proud of this honour, and it would be only doing our duty in carrying out the principles upon which this Institution was founded. I am sure there are a great many names of world-wide reputation and also national character, which, if added to this Institution, would be of very great benefit to it. The next alteration of the Bye-Laws is in Section II, under the head of “Composition.” The proposal is that the following be added :—“5. Temporary

Members. *A*.—1. Members of the United Service Institution of India proceeding to the United Kingdom on two or three months' 'Privilege' leave, or on six months' leave, shall be permitted as 'Temporary Members' to attend the Lectures and to use the Reading Room, &c., of the Royal United Service Institution (but not receive the Journal) on payment of a subscription of five (5) shillings. 2. Should those joining as above obtain an extension of leave, they can extend their 'Temporary Membership' on the payment of an additional 5s. for any period not exceeding six months. 3. Members of the United Service Institution of India proceeding to the United Kingdom on 'Furlough,' or leave exceeding six months, shall be permitted to attend Lectures and use the Reading Room, &c., of the Royal United Service Institution on payment of 10s. per annum. Should they wish also to receive its Journal (which can only be delivered by the Secretary on personal application, or to an authorised agent, without incurring postage charges), an additional annual payment of 10s. will be necessary. 4. In the event of 'Temporary Members,' under paragraph 1, obtaining an extension of leave for six months, and wishing also to obtain the Journal, they can do so on payment of fifteen (15) shillings in addition to the five shillings already paid. 5. All the above subscriptions to be paid in advance, and admission as a 'Temporary Member' to take place on payment. 6. The above rules will apply to both Life and Annual Members of the United Service Institution of India. *B*.—1. Members of the Royal United Service Institution shall, throughout their service in India, be entitled to be in all respects (including receipt of Journal without extra payment) Members of the United Service Institution of India on payment of an Annual Subscription of Rs. 5 (in advance). *C*.—1. Any Member of either Institution will be entitled to obtain the Journal of the other on payment (in advance) at Members' prices. 2. The Secretaries of both Institutions will interchange lists of Members, made up to date, periodically." The object of this resolution is to confirm an application entered into between this Institution and the United Service Institution of India. You will easily appreciate that that will be of very great benefit to both Institutions. It will lead to mutual co-operation and mutual interchange of work. I am sure it will be of very great advantage to us, looking to the distinguished officers of that great Army in India, and to the great school for military art and science which is afforded in the Indian Empire.

Colonel MALCOLM GREEN:—

I have much pleasure, my Lord, in seconding this Resolution, particularly as the Services are so intimately connected with science in all its branches. I think that the permanent connection between this Institution and the Indian Institution should be no longer delayed.

General Sir BEAUCHAMP WALKER:—

As I was one of the members of the Council who opposed the introduction of the first of these two Resolutions, I hope I may be allowed to say a word on the present occasion. At present our Vice-Patrons are certain members of the Ministry, the Viceroy of India and the Lord-Lieutenant of Ireland, the Admirals of the Fleet and the Field Marshals, and there, I think, they should remain. I think by the alterations proposed by Sir Erasmus Ommanney we should introduce a contentious element. I think the addition proposed indicates a clear departure from what has been the previous custom in respect to the Vice-Patrons, and it would introduce a contentious element which we are much better without. One man will have his pet, and another man will have his pet, and we shall have all sorts of people put forward as Vice-Patrons, which will end in a great deal of confusion. I therefore am most clearly of opinion that the Resolution should not be accepted. I said so at the meeting of the Council at which it was considered. That meeting consisted of six Members, of whom four were against me, and the other was with me. I wish that clearly to be known in this theatre, as I do not wish to pass it by with a silent vote.

Admiral Sir ERASMUS OMMANNEY :—

With regard to the latter part of your speech I may say that the matter had been discussed at a previous meeting of the Council, and a month's notice given, and a notice paper sent out to every member of the Council.

General Sir BEAUCHAMP WALKER :—

There were but six members present.

The CHAIRMAN :—

Perhaps I had better put these Resolutions separately. I will first put the portion of the Resolution referring to Vice-Patrons.

The Resolution was put from the Chair, and lost by a large majority.

The CHAIRMAN :—

I will now put the second part of the Proposal having reference to the affiliation with the United Service Institution of India.

The Resolution was put from the Chair, and was unanimously adopted.

Lord GEORGE HAMILTON then vacated the Chair, which was taken by General ERSKINE, Chairman of the Council.

Lord CHELMSFORD :—

My Lords, Ladies, and Gentlemen,—I have the pleasure to propose that a vote of thanks be passed to the Right Honorable Lord George Hamilton for taking the Chair upon this occasion. I should like very much to add on my own account, and I believe it will be the feeling of all those who are present also, that the words "for his able conduct in the Chair" be added to that Resolution. We all feel very much indebted to the First Lord of the Admiralty, and to the Secretary of State for War for taking such a deep interest in this Institution. And when we know how busy those two Officers of the Crown are, and how much engaged in public affairs, it seems to me that we cannot but pass a very hearty vote of thanks to Lord George Hamilton for having come in this way to help us in our Annual Meeting. The proceedings have lasted so much longer than they usually do that I shall confine myself to this remark, being sure that all of us feel a great deal more than we are able to express to him for his kindness.

Admiral Sir GEORGE WILLES :—

I have much pleasure in cordially seconding the Resolution. Our comparatively empty benches to-day do not, I am sure, imply a want of sympathy and welcome to our noble Chairman. The fact is this: a good many of us have come to the time of life when we cannot face such weather as that of this afternoon. It is truly Arctic. I have known these Annual Meetings in the month of March to be held in warm sunshine, and then we have been honoured by the presence of a number of ladies. I am sure but for that unavoidable circumstance they would have been very glad to have come here to-day, especially on the interesting occasion of awarding the Gold Medal to Captain Cleveland.

The Resolution having been put from the Chair, was carried by acclamation.

LORD GEORGE HAMILTON :—

General Erskine, my Lords, and Gentlemen,—I thank you for the vote that you have been kind enough to pass. I think it is a good arrangement by which those who are temporarily entrusted with the duties of administration, both of the Army and of the Navy, should alternately preside at the Annual Meetings of this most important Institution. It is two years since last I had the honour of so doing, and

I regret to say that, in one sense, things are in very much the same position now as they were then. I fear no advance has been made as to the settlement of that all-important question of where this Institution is to be for the future located and housed. Well, my colleague, Mr. Stanhope, as well as myself, have done our best to impress upon the Chancellor of the Exchequer the important nature of the function which this Institution discharges, and I think we are fortunate, in one sense, in having to deal with a Chancellor of the Exchequer who himself was once head of a spending department, in whom imperial instincts are largely developed, and who has so well controlled the finances of this country, that he has given more to the Army and Navy to spend than any preceding minister, and yet has associated with that, a reduction rather than an increase of taxation. We may be sure that the Chancellor of the Exchequer will approach this question in no niggardly spirit, but the demand put forward was somewhat large; the Treasury were asked to erect a building to cost some £30,000; it was to be in the close neighbourhood of Pall Mall, which is probably the most expensive part of London; the rent was to be free; and the Institution were to be left in receipt of an income absolutely adequate to their future wants. Well, now, I do not wish to go into the disputed point that Colonel Hale has raised; it is quite true that the knowledge that this Institution is in a dilapidated condition may prevent its development, and may to some extent—though I do not think it ought—but may to some extent account for the fact that the number of members is not increasing. But, if Mr. Stanhope and I press the claims of this Institution upon the Chancellor of the Exchequer, he will want us to give him some evidence that, when that impediment which it is said now prevents the development of the Institution is removed, there is good *bonâ fide* evidence that the Institution will largely develop, and will play that part in connection with the two Services, which would alone justify that large expenditure which he is asked to incur. And, therefore, without in any way going into any of the points which Colonel Hale raised, and which I am wholly incompetent to discuss, I do hope the Council will bear the axiom in mind, that if you want the Government to help you, you must help yourselves as regards the future.

Now, gentlemen, it is needless to say that I attach the highest importance to the preservation and extension of this Institution. It seems to me to discharge most important functions. So long as it is necessary, and I suppose it always will be necessary under Parliamentary Government, that the administrative head of the Army and Navy should be civilians, they must mainly depend upon their technical advisers for the advice given in reference to the great mass of the questions which they have to settle. But speaking for the Navy, I say, no matter how able or industrious the Naval Lords of the Admiralty may be, there are a large number of questions which it is absolutely impossible for them satisfactorily to thrash out. It seems to me, in speaking on behalf of the Navy, that this Institution is almost of more importance to that Service than to the Army. There have been great military wars during the last few years. Those military wars have perfectly revolutionised the system of military administration, and of military tactics, and of military organisation. There have been no great naval wars. What may occur in the next naval war is purely a matter of speculation. A great change, no doubt, has taken place in the armament of land forces, but, after all, the change is nothing compared to that which has taken place in the armament of the Navy, and, therefore, it does seem to me that this Institution can discharge most important duties, and especially in reference to the Navy, by discussing and elucidating part of the problems which it is our duty to solve as far as we can.

Well, then, my Lords and Gentlemen, there is another function which, I think, this Institution can satisfactorily perform. It can establish something like stability and continuity of military and naval opinion. Now I am far from saying that a man must not change his opinion, but, undoubtedly, one of the difficulties which we have to encounter in Parliament is that so many of the so-called experts differ on the questions on which they are consulted. I am going to make a suggestion. I do not know that it would be possible to make a rule that no military or naval officer should write a letter to a newspaper unless he was a member of this Institution, and that no letter should go to the newspaper until it

had been discussed. It seems to me that such a regulation might increase your numbers, and diminish the letters to the newspapers. This is a joking matter, but I can assure the naval and military members here present, that the fact that there is very frequently a wide difference of opinion upon such vital questions, and that difference expressed in the most open way in the newspapers, by eminent military or naval men, does give an opportunity to those who look upon all expenditure in the Army and Navy as sheer waste, to oppose any propositions that are made, because they say that they are not made on a firm and reliable basis, and the officers are not at one to whom they look for guidance.

Then there is another and perhaps even more important function than either of those which I have mentioned, which I think this Institution can perform. I think it might do much towards promoting and considering the method by which, in certain eventualities, co-operation might be secured between the two Services. The Report of the Commission over which Lord Hartington has presided, will shortly be laid before the public, and will afford to all of you most interesting reading. I know that some have endeavoured to secure co-operation between the two Services by suggesting that they should be under one head, or by endeavouring to apply to both Services the same uniform regulations, and the same conditions. In my humble judgment, no greater mistake can be made; each have their separate and distinct spheres of action; it is the duty of the Navy to prevent an attack being made, it is the business of the Army to repel an attack when made; and if either Service are allowed absolutely to prescribe the conditions which are applicable to the other, they will naturally take those which are the most effective to enable them to discharge their particular service, but which may be absolutely detrimental to the other Service taking the duty allotted to them. In all these essentials, I believe this Institution could do much. One speaker spoke of the legitimate influence of authority which members of the Army and Navy can exercise. I gladly bear testimony to that fact. Last year, when it was my business to make certain proposals to Parliament with reference to the Naval Defence of the country, I was glad to find, after a few days, that I had behind me the absolute unanimous support of a united, loyal, and powerful Service, and the fact that every naval officer of distinction was prepared to sink differences of detail, in order to promote an object which he admitted to be good, undoubtedly greatly facilitated the passing of that measure, and enabled us to overcome with great ease the only opposition which it met.

Therefore, gentlemen, being grateful for the assistance and support which I have received from the Service with which I have the honour to be associated, you may rely upon my doing everything in my power to see that this Institution is properly located and properly housed. I have an idea in my head, but I cannot give more: it is a practicable, and I think a feasible idea. I looked into your finances, and I saw that although nominally you have a considerable sum invested, a very small proportion of that is available for building; I have taken that fact into consideration. I think it was Colonel Hale who suggested that he preferred rather that deputations should visit the minister, than that negotiations should be carried on by one individual. Well, now, may I give a little warning to all here present? If there is one thing that any official man hates, it is a deputation, and particularly a deputation that does not agree, because we all of us work under great pressure. We have not very much time to spare. I believe if you can get a really capable man in whom you have confidence, it is much better to entrust him with negotiations, than to constantly bother ministers by going in large numbers to them. There are a number of small details in connection with a claim of this sort, which require careful investigation, and a large body going before a minister is not the kind of tribunal from which you can elicit accurate and minute replies to the various queries put. I am reminded that the hour is late, and I have, perhaps, trespassed longer upon your time than is customary. I can only assure you that I will do my very best to promote your interests, and I am sanguine enough to hope that between now and next year, we really shall be on firmer ground, and that the Treasury will be in a position to make some definite and, I hope, acceptable offer.

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 Browne, E. S., **U.C.**, Major S. Wales Bord.

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Browne, G. F., DSO, Capt. Northn. Regt.
Gold Medallist, Military Essay,
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 Browne, H. D., Major K. R. Rif. C.
 Browne, J. H. G., Lt.-Col. late R.A.
 Browne, *Sir* S. J., **U.C.**, KCB., KCSI,
 Gen. Ben. S.C.
 Browne, W. B., Major D. of Corn. L. I.
 *Browning, M. C., Col. 3rd Bn. Suff.
 Regt.
 Brownlow, *Sir* C. H., GCB., Gen. Ben. S.C.
 Brownlow, W. A. de V., CB., Capt. (retd.)
 R.N.
 *Brownrigg, H. S., Major Rif. Brig.
 Bruce, H. J. L., Lt.-Col. late Cold. Gds.
 Brunner, Henry, Major late 2nd V. B. S.
 Lanc. Regt.
 Buchanan, D. C. R. C., CB., Col. 3rd Bn.
 Sco. Rif.
 Buchanan, H. J., CB., Maj.-Gen. late 9th
 Regt.
 Buck, W. T., Lieut. Durh. L. I.
 Buckle, *Sir* C. H. M., KCB., Adm. (retd.)
 Buckle, C. M., Vice-Adm. (retd.)
 Budd, A. J., Capt. Lan. Arty. (S. Div. R.A.)
 Buller, E. W., late Lieut. R.A.
 Buller, H. M., Col. 1st Regt. C. I. Horse.
 Bullock, G. M., Capt. Devon Regt.
 Bulwer, *Sir* E. G., KCB. Lieut.-Gen.
 Bunbury, H. N., Major A.S. Corps.
 Bunbury, W. St. P., Capt. R.A.
 Burges, W. E. P., Capt. 3rd Bn. Glouc.
 Regt.
 *Burgess, A., Maj. late Q. O. L. I. Mil.
 Burgess, F. F. R., Major Ben. S. Corps
 Burgess, H. M., Lt.-Col. R.A.
 Burgoyne, R. dhu G. H., Capt. late 93rd
 Highlanders
 Burn, D. B., Lt.-Col. 18th Huss.
 Burn-Murdoch, John, Capt. R.E.
 Burnaby, R. B., Maj. 1st Bn. E. Surr.
 Regt.
 Burnaby, C. G., Lieut. R.E.
 Burnand, N., Lt.-Col., late Cold. Gds.
 Burne, G. H. P., Capt. Leic. R.
 Burnell, E. S. P., Col. late Cold. Gds.
 Burney, H. S. S., Lt.-Col. late Paym.
 Burrard, C., Lieut. R.A.
 *Burroughs, C. A. P., Capt. S. Lan. Regt.
 Burrowes, H. G., Capt. R.A.
 Burton, C. W., Maj.-Gen. R. M. L. I. (retd.)
 Burton, H., Col. 4th V. B. S. Wales Bord.
 Bury, Viscount, KCMG., Col. 12th Civil
 Service R. Vols., *ADC.*
 Bushby, J. Wm., Lt.-Col. late 13th Q.'s
 W. R. V.
 Bushell, John M., Capt. late R.N.
 Butler, Henry, Admiralty
 Buttanshaw, W. H., Major Paym. 16th
 Lanc.
 Buxton, H. E., Lt.-Col. 2nd V. B. Norf. R.
 Byles, M., Capt. R.N.
 Byng, Geo. P. E., Maj. Yorks. L. I.
 Byng, *Hon.* H. W. J., Col. 7th Bn. K.R.L.R.
 Corps
 Byng, *Hon.* J. H. G., Lieut. 10th Huss.
 Byrne, T. E., Maj.-Gen. late R.A.

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CADELL, R., CB., Gen. R.A.
 Cadell, Thos., **U.C.**, Col. Beng. S. C.
 Calderon, C. M., Lt.-Col. late K. R. Rif. C.
 Callaghan, G. A., Comr. R.N.
 Callwell, C. E., Capt. R.A. **Gold Medal-**
ist, Military Essay, 1887.
 Calthorpe, *Hon.* Somerset J. G., Lt.-Gen.,
 Col. 5th Lancers
 Cameron, A. S., **U.C.**, CB., Col. late
 K. O. Bord.
 *Cameron, H. H. A., Maj. Bedf. Regt.
 Cameron, J. W., Lt.-Col. 4th Durh. Art.
 Vols.
 Cameron, W. Gordon, CB., Lt.-Gen.
 Campbell, *Sir* Archibald C., Bart., MP.,
 Col. 4th Batt. Arg. & Suth. Highrs.
 Campbell, A. H., Lt.-Col. late Ben. S. C.
 Campbell, C., CB., Col. late 7th Dr. Gds.
 Campbell, Charles, Capt. R.N.
 Campbell, D., Lt.-Col. late 90th Regt.
 Campbell, D. A., Major Rl. Innis. Fus.
 Campbell, *Sir* Duncan A. D., *Bart.*, Capt.
 4th Bn. Highd. L.I., Gent. Usher of the
 Green Rod
 Campbell, F. Lorn, Col. S. Gds.
 Campbell, *Sir* Geo., *Bart.*, Capt. late 1st Drs.
 Campbell, Henry A., late Lieut. R.H.A.
 Campbell, *Hon.* H. W., Lt.-Col. late Cold.
 Gds.
 *Campbell, J. R., Lt.-Col. late 2nd Brig.
 S. Div. R.A.
 Campbell, L. W. Y., Lieut. 25th Regt.
 Mad. I.
 Campbell, P. John, Maj.-Gen. late R.A.
 Campbell, W., Major R.M.A.
 Campbell, W. A., Capt. 2nd Bn. Dorset. Regt.
 Campbell, W. P., Capt. K. R. Rif. C.
 Campbell, W. S., late Lieut. Rifle Brig.
 Campbell-Johnston, A. F., Capt. E. Kent
 Regt.
 Campbell-Johnston, S. C. G., Lieut. Rl.
 N. R.
 Cardale, C. S., Capt. R.N.
 Carden, *Sir* F. W., *Bart.*, Lt.-Col., late
 5th Lancers
 Carden, H. C., Capt. Devon Regt.
 Cardew, Fred., Col. late S. Lan. Regt.
 Cardwell, R., Capt. late 3rd Bn. R. Lan.
 Regt.
 Cardwell, W. A., Lt.-Col. 2nd Vol. Bde.
 Cinq. Port. Div. R.A.
 Carew, P. M. L., Lieut. 20th Huss.
 Carey, Constantine P., Maj.-Gen. late R.E.
 Carey, H. R. Le M., Lt.-Col. Ben. S.C.
 Carleton, F. R. C., Capt. 2nd Bn. Durh. L. I.
 Carleton, Geo., Col. late R.A.
 Carleton, G. D., Capt. Leic. Regt.
 Carleton, L. R., Capt. Essex Regt.
 Carpenter, G. W. W., Major late 32nd Ft.
 Carr, F. S., Lt.-Col. 5th Punjab Cav.
 Carré, G. T., Lt.-Col. R.A.
 Carrick, *EARL* of, Capt. late Gr. Gds.
 Carrington, E., Lt.-Col. 1st Bn. Worc. Regt.
 Carrington, *Sir* F., KCMG., Col. S. Wales
 Bord.
 Carter, H. Bonham, Lt.-Col. late Cold. Gds.
 Carter, H. M., Major, Wilts. Regt.

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*Carter, F. W., Col. late 3rd Brig. Scottish Division, R.A.
 Cartwright, H., Col. late Gr. Gds.
 Case, John, Esq., Navy Agent
 Cass, A. H., Col. late 10th Huss.
 Casson, B. T., Lt.-Col. 3rd Bn. Yorks. Regt.
 Castle, E. S., Capt. Subm. Mining Mil.
 Castle, W. H., Capt. 2nd V. B. Middx. Regt.
 Castle, W. McCoy Fitzgerald, Capt. R.N.
 Castletown, LORD B. E. B., Major R. E. Kent Yeo.
 *Caulfield, J. A., Major late Royal Tyrone Fus., late Capt. Cold. Gds.
 Caunter, J. E. Capt. Welsh Regt.
 Cautley, Henry, Lt.-Col. R.E.
 Cavan, EARL of, Lieut. late R.N., M.P.
 Cave, C. C., Lieut. 1st City of Lon. Rif. Vol. Bde.
 Cavenagh, G., Maj.-Gen. late Beng. S. C.
 Cavenagh, Sir Orfeur, KCSI., Gen. late Ben. S. C., Col. 3rd V. B. E. Surr. Regt.
 Cavenagh, W. O., Capt. Bedf. Regt.
 Cavendish, A. E. J., Capt. Arg. and Suthd. Highrs.
 Cavendish, Jas. Chas., Capt. late R.A.
 Cavendish, S. F. G., Capt. Shrop. L.I.
 Cawkwell, W., Lt.-Col. late Eng. Railway Vol. Staff Corps
 Cecil, Eustace, LORD, Lt.-Col. late Colds. Gds.
 Cecil, LORD E. H., Lieut. Gren. Gds.
 Chads, Sir Henry, KCB., Adm. (retd.)
 Chadwick, D. D., Lt.-Col. E. Sur. Regt.
 Chadwyck-Healey, C. E. H., Sub.-Lieut. R.N.A.V.
 *Chalmer, R., Major K. R. Rif. C.
 Chambers, A. W., Lt.-Col. 15th Mid. R.V.
 Chambers, E., Capt. 3rd Kent Arty. Vols.
 Chambers, F., Col. late 1st King's Own Staff. Mil.
 Chamberlayne, T. J., Major late S. Staff. Regt.
 Chamberlayne, W. J., Gen.
 Chapman, Sir F. E., GCB., Gen. R.E.
 Chapman, J. J., Capt. late N. York Mil.
 Chapman, L. J., Lieut. R.A.
 *Chapman, W. E., Major late 2nd Brig. N. Div. R.A.
 Chapman, W. H., Maj. late Leicester Mil.
 Charley, John, Maj.-Gen. late K. R. Rif. C.
 Chater, Vernon, Lt.-Col. Arg. and Suthd. Highrs.
 Chatfield, A. J., CB., Rear-Adml.
 Chelmsford, LORD, GCB., Gen.
 Chenevix-Trench, F., CMG., Maj.-Gen. late 20th Huss.
 Chesham, LORD, Lt.-Col. Roy. Bucks Yeo.
 Chesney, G. T., CB., CSI., CIE., Lt.-Gen. R.E.
 Chichester, A. G., Capt. Rl. Irish Regt.
 Chichester, H. A., Major late K. O. Sco. Bord.
 Chichester, S. F., Capt. R. Sc. Fus.
 Childers, E. S. E., Major R.E.
 Christian, H. R. H. PRINCE F. C. A., of Schleswig-Holstein, KG., Gen.
 Christie, Fred. Gordon, Lt.-Col. late (h.p.)
 Church, H. F., Col. 3rd Middx. R.V.
 Churchill, A. B. N., Capt. R.A.

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Churchill, F. V. S., Lieut. (h.p.) late Rl. Sco. Fus.
 *Clanchy, Henry T., Comr. R.N.
 Clanwilliam, EARL of, KCB., KCMG., Adm.
 Clark, G. B., Col. 2nd V. B. Middx. Regt.
 Clarke, Sir Andrew, GCMG., CB., CIE., Lt.-Gen. R.E.
 Clarke, C. Harwood, Major late 1st Lon. Art. V.
 Clarke, C. M., CB., Maj.-Gen. late 57th Regt.
 Clarke, F. C. H., CMG., Col. R.A.
 Clarke, S. C., Lt.-Col. R.E.
 Clarke, S. de A. C., CMG., Col. late 6th Dr. Gds.
 Clayton, Emilius, Lt.-Col. R.A. **Sold Medallist, Military Essay, 1879**
 Clayton, F. A. T., Lt.-Col. late Gr. Gds.
 Clayton, Fran. S., Capt. R.N.
 Clayton, J. W., Capt. late 13th Lt. Drs.
 Clayton, V. G., Col. R.E.
 Clerk, H., Major 2nd Dr. Gds.
 Clerk, H., Maj.-Gen. late R.A.
 Clery, C. F., CB., Brig.-Gen. Comdt. Staff Coll. late 32nd Regt.
 Clifford, Sir R. C. S., Bart., Col. late Gr. Gds.
 *Clinton, LORD E. W. P., Col. 1st City of Lon. Rif. Vol. Bde., late Rifle Brig.
 Clitherow, E. J. S. Lt.-Col. late S. Gds.
 Clive, E. H., Maj.-Gen. late Gr. Gds.
 Close, Frederick, Maj.-Gen. R.A.
 Clowes, C. E., Capt. 7th Bn. K.'s Rl. Rifle Corps.
 Clowes, G. G., Major late 8th Huss.
 Clutterbuck, W. R., Capt. R.N.
 Cochran, Francis, Lt.-Col. Hamps. Regt.
 Cockburn, C. V., Major-Gen. late R.A.
 *Cockburn, J. G., Col. late R. War. Regt.
 *Cockle, G., Maj. late 4th Bn. Bord. R.
 Cocks, O. Y., Maj. late 4th Regt.
 Codrington, W. W., late Lt. 17th Lanc.
 Coe, E. O., late Lt. Edmonton R. Rifles
 Coffin, Campbell, Lieut. R.E.
 Coghill, F. H., Capt. 7th Lan. Arty. Vols.
 Coke, J. T., Col. K. O. Sco. Borderers.
 Coke, Thos. W. VISCOUNT, Lt.-Col. Scots Gds.
 *Coker, E. R., DSO., Col. late Durh. L. I.
 Cole, J. A., Gen.
 Cole, W. U., Major 3rd Dr. Gds.
 Coles, Alfred, Col. 2nd V. B. E. Surr. Regt.
 Coles, Chas. H., Lt.-Col. 1st City of Lon. A.V.
 *Collen, E. H. H., CIE., Maj.-Gen. Beng. Staff Corps.
 Collingwood, H., Lt.-Col. 2nd Bn. Glouc. Regt.
 Collins, C., Major late 1st Bn. S. York. Regt.
 *Collinson, T. B., Maj.-Gen. late R.E.
 Collyer, G. C., Col. late R.E.
 Colman, G. B. T., Lt.-Col. Unatt.
 Colomb, Geo. H., FSA., Col. late R.A.,
 Colomb, Sir J. C. R., KCMG., MP., Capt. (retd.) R.M.A.
 *Colomb, P. H., Rear-Adm. (retd.). **Sold Medallist, Naval Essay, 1878.**

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Colquhoun, J. A. S., Lt.-Col. R.A.
 *Colville, C. F., Lt.-Col. late 11th Regt.
 Colville, F. M., CB., Lieut.-Gen., Comg.
 Welsh Bord. Vol. Bde.
 Colville, H. E., CB., Col. Gren. Gds.
 Colwill, Hugh G., Capt. late 29th Regt.
 Colville, A. E. W., Capt. Rifle Brig.
 *Comber, H. W., R.-Adm. (retd.)
 Combermere, Wellington H. S., VISCOUNT,
 Col.
 Commeline, C. E., Capt. R.E.
 Commerell, Sir J. E., **¶**, GCB., Adm.
 Comerford, Jas. W., Lt.-Col. 13th Mid. R.V.
 Compton, H., Capt. 2nd V. Bde. Essex
 Art.
 Compton-Bracebridge, J. E., Lieut. 3rd
 Middx. Art. Vol.
 Comyn, D. R., Lieut. R.N.R.
 Congleton, LORD, Lieut. late R.N.
 Connolly, E. M., Maj.-Gen.
 Connolly, L. R., Capt. R.M.A.
 Conner, W. D., Capt. R.E.
 Conor, C., Major W. R. Regt.
 Conyngham, MARQUIS of, Capt. 3rd Bn. Rl.
 Dub. Fus.
 Cook, H., Maj.-Gen. late York. Regt.
 Cooke, A. C., CB., Lieut.-Gen. late R.E.
 Cooper, Edw. H., Lt.-Col. late Gren. Gds.
 Cooper, F. E., Capt. R.A.
 Cooper, Harry, Maj. L. N. Lan. R.
 Cooper, R. J., Lieut. Gren. Gds.
 Cooper, W. Cooper, Maj. late Bedford Mil.
 Cope, Sir W. H., *Bart.*, late Lieut. Rifle
 Brig.
 Copeman, E. S., Lieut. 3rd V. B. Norf.
 Regt.
 Copland-Crawford, R. F., Gen. R.A.
 Coppinger, T. S., Major Staff Paym. A. P. D.
 Corballis, J. A., Col. late R. Dub. Fus.
 Corballis, J. F. J., Lieut. Rl. I. Regt.
 Corkran, C. S., Col. Gren. Gds.
 Cornish, C. O., Lt.-Col. late R. Highrs.
 Cory, A., Col. late Beng. S. Corps
 Corry, Hon. Hen. W. L., Col. Cold. Gds.
 Cosby, T. P., Maj.-Gen. late W. York.
 Regt.
 Cotes, C. J., Lt.-Col. late Gren. Gds.
 Cotton, A. W., Lieut. Gren. Gds.
 Cotton, C. McClintock, Maj.-Gen.
 Cotton, R. B., Major 2nd Bn. Wilts. Regt.
 Coulson, J. B. B., Capt. late Rifle Brig.
 Courtenay, E. Jas., Major R. Suss. Regt.
 Courtney, D. C., Major late R.E.
 Cowan, Phineas, Lt.-Col. late 3rd Lon.
 R. V.
 Cowans, J. S., Lieut. Rif. Bde.
 Cowell, Rt. Hon. Sir J. C., KCB., Maj.-Gen.
 late R.E.
 Cowley, EARL, Lt.-Col. late Cold. Gds.
 Cox, F. E., Maj.-Gen. late R.E.
 Cox, H. J. W., Major 2nd Kent Art. Vols.
 Cox, J. B., Maj.-Gen. Ben. S.C.
 Cox, R. Sneyd, Major late Hereford Mil.
 Coxhead, J. A., Major R.A.
 Crabbe, E. M. S., Major Gren. Gds.
 Cradock, E. W., Lt.-Col. late Rl. Fus.
 Craigie-Halkett, C. H., Lt.-Col. R.E.

Craigie, J. H. S., Maj. High. L. I.
 Cranborne, VISCOUNT, MP., Major 4th Bn.
 Bedf. Regt.
 Craster, G. A., Maj.-Gen. R.E.
 Craster, S. L. Lieut. R.E.
 Craufurd, Sir C. W. F., *Bart.*, Lieut.
 (retd.) R.N.
 Craufurd, H. J., Capt. Gren. Gds.
 Craven, Wm. George, late Lieut. 1st Life
 Gds.
 Crawford and Balcarres, EARL of, Col. 1st
 V. B. Manc. Regt.
 Crawford, A. T., Lieut. R.A.
 Crawford, Geo. A., Maj. late 4th R. Lanc.
 Mil.
 Crawley, A. P., Capt. Gren. Gds.
 *Crawley, T. G., Col. L'pool Regt.
 Creagh, A. G., Lt.-Col. R.A.
 Crealock, H. H., CB., CMG., Lt.-Gen.
 *Creek, E. S., Lt.-Col. R. W. Fus.
 Cremorne, Vesey, LORD, Lt.-Col. late Cold.
 Gds.
 Creswick, N., Col. 4th W. York Art. Vols.
 Creyk, William, MB., Brig.-Surg. M.S.
 *Crichton, Hon. H. G. L., Col. Hants
 Yeo., late 21st Huss.
 *Crofton, Stephen S. L., Vice-Adm. (retd.).
 Crole-Wyndham, W. G., Major 21st Huss.
 Cromie, C. F., Capt. Hamp. Regt.
 Crompton-Roberts, H. R., Lieut. Gren. Gds.
 Cross, Charles H., Comr. R.N.
 Crosse, Joshua G., Major late 88th Regt.
 *Crossnan, Sir William, KCMG., Maj.-Gen.
 late R.E., MP.
 Crowe, Robt., Capt. (h.p.)
 Crutchley, W. C., Lieut. R.N.R.
 Cubitt, E. N., Capt. 1st V. B. Essex Regt.
 *Cuffe, O. W., Maj. and Adj. Waterford
 Arty. (S. Divn. R.A.) Capt. (h.p.) R.M.A.
 Cumberland, C. E., C.B., Maj.-Gen. late R.E.
 Cumberlege, H. O., Col. Ben. N.I.
 Cundell, H. S., Capt. 13th Middx. R.V.
 Cuninghame, Sir W. J. M., *Bart.*, **¶**,
 Col. Comg. Clyde Inft. Vol. Bde.
 Cunliffe, W. H., Major Oxf. L. I.
 Cunningham, J. D., Major R.A.
 Cureton, E. B., Lt.-Gen.
 Curme, C. T., Vice-Adm.
 Currie, A. D., Col. late 2nd Bn. Welsh Regt.
 Currie, Samuel, CB., QHP., Surg.-Gen. MD.
 Curtis, F. G. S., CMG., Col. late 6th Innis.
 Drs.
 Curtis, James D., Capt. (retd.) R.N.
 Curtis, R. S., Lieut. R.E.
 Curtis-Hayward, J. F., Lt.-Col. late K. O.
 Bord.
 Curtis, Reginald, Maj.-Gen. late R.A.
 Curzon, Hon. Montague, Major Rif. Brig.
 Cust, John Francis, Col. late Gr. Gds.
 Custance, S., Lieut. Duke of Corn. L. I.
 Cutbill, H. D. A., Major R. Ir. Rif.

D'AGUILAR, Sir Chas. L., GCB., Gen.
 R.A.
 Dallas, Jas., Capt. R.E.

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Dallas, J. H. L., Capt. R.A.
 Dalmahoy, P. C., Col. Ben. Inf.
 Dalrymple, *Hon.* N. de C., Capt. Sco. Gds.
 d'Arcy-Irvine, St. G. C., CB., Rear-Adm.
 Dalton, J. C., Major R.A.
 Danby, W. E., Capt. 7th Dr. Gds.
 Daniell, J. F., Capt. R.M.L.I., **Gold Medalist, Military Essay, 1889.**
 Daniell, J. Le G., Col. 4th Bn. E. Surr. Regt.
 Darby-Griffith, C. W., Lt. Gren. Gds.
 Darley, W. S., Lt.-Col. late South Staff. Regt.
 Darling, Sydney, Maj.-Gen. late 9th Foot
 *Dartmouth, EARL of, Capt. late Staff. R.V.
 Darwall, W. E., Comr. R.N.
 Darwin, C. W., Major Durham L. I.
 Darwin, S. C., Capt. R.N.
 Daubeny, E., Major late 58th Regt.
 Daubeny, W. A., Major late 3rd Buffs.
 Daughlish, G. V., Capt. E. Kent Regt.
 Davidson, A. H., Maj.-Gen. late R.A.
 Davidson, A. Percy, Sub-Lieut. R.N.
 Davidson, C. R. T., Col. late R.E.
 *Davidson, D., CB., Col. Q.'s Edin. Rif. Vol. Bde. (Loth. Regt.), late Bom. Army.
 Davidson, G. F. de B., Major 2nd Bn. R. K. Highrs.
 Davidson, G. V., Lieut. R.A.
 Davies, F. J., Lieut. Gren. Gds.
 Davies, H. F., Maj.-Gen. late Gren. Gds.
 Davies, J. G. S., Lt.-Col. late R.E.
 Davis, Hugh, Capt. (retd.) R.N.
 *Davis, John, FSA., Lt.-Col. 3rd Bn. R. W. Sur. Regt.
 Dawes, Thomas, Col. late Ben. S.C.
 Dawson, D. F. R., Capt. Cold. Gds.
 Dawson-Damer, L. G. H. S., Lieut. late Scots Gds.
 Dawson-Scott, R. N., Col. (h.p.) R.E.
 Dawson, V. J., Major Cold. Gds.
 Deane, H. B., Col. 21st Middx. R.V.
 Deane, J. D., Comr. R.N. (retd.)
 Deane, R. W., Lieut. Lanc. Fus.
 Dean-Pitt, D. C., Lt.-Col. R.A.
 Deare, G. R., Major late Cape Col. Forces de Bathe, *Sir* H. P., *Bart.*, Gen., Col. Shrop. L.I.
 de Berniere, H. J. de B., Lt.-Col. Worces. Regt.
 de Burgh, U. G. C., Capt. 7th Dr. Gds.
 De Butts, A., late Capt. Rl. Guernsey Mil.
 *de Fonblanque, E. B., late Controller
 *Degacher, H. J., CB., Col. late S. Wales Bord.
 de Hodgson, D. F., MD., Brig.-Surg. M.S.
 de Houghton, J., Capt. Linc. Regt.
 *De Horsey, A. F. R., Adm.
 de Jersey, W. G., Capt. R.A.
 De Kantzow, Herbert P., Adm. (retd.)
 Delavoye, A. M., Lt.-Col. late Essex Regt.
 de Moleyns, T. A., Maj.-Gen. late R.A.
 De Montmorency, R. O., Col. late R. Ir. Rif.
 Denison, Henry, Capt. Notts Yeo., Lt.-Col. late R.E.

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Denniss, G. L. T., Major 1st Bn. Wilts. Regt.
 Dent, H. W., Capt. R. W. Surr. Regt.
 Desborough, John, CB., Maj.-Gen. R.A.
 Despard, W. F., Lt.-Col. 3rd V. B. R. W. K. Regt.
 de Vesci, J. R. W., **VISCOUNT**, Lt.-Col. Hon. Arty. Compy., late Cold. Gds.
 Dewar, J. C., Capt. late 11th Huss.
 Dewar, J. R. J., Lt.-Col. late R.A.
 de Winton, C., Capt. Hamps. Regt.
 de Winton, *Sir* F. W., **KCMG.**, CB., Col. late R.A.
 Dibley, G., Capt. 5th Bn. Royal Fus.
 Dick, J. P., Maj. Forfar and Kinc. Arty. (S. Div. R.A.).
 Dick, Wm., MD., I.-G. of Hosps.
 Dick-Cunyngham, W. H., **U.C.**, Capt. Gord. Highrs.
 Dicken, Charles G., Comr. R.N.
 Dickens, C. H., CSI., Lt.-Gen. late R.A.
 Dickson, E. T., Major Rl. Berks. Regt.
 Dickson, W. G., MD., late Staff Assist. Surgn.
 Digby, *Hon.* Gerald F., Lt. R.N.
 Digby, Noel S. F., Capt. R.N.
 Dillon, **VISCOUNT**, Dep.-Lieut. Co. Mayo
 *Dillon, *Hon.* Harold A., Major 4th Bn. Oxf. L.I., late Lieut. Rifle Brig.
 Dillon, *Sir* Martin, KCB., CSI., Lieut.-Gen.
 Dineley, F. G., Lieut. R.N.
 *Disney, E. J., Col. 3rd Bn. Essex Regt.
 *Disney, T. R., Major R.A.
 Dixon, Geo. W., Capt. 2nd V.B. Middx. Regt.
 Dixon, Jesse, Staff Comr. R.N.
 Dixon, J. Whitly, Staff Comr. R.N.
 Dixon, P. E., Capt. R.E.
 Dixon, R. T., Lieut. R.E.
 Dixon, W. C., Major 3rd V.B. Rl. W. Surrey Regt.
 Dobbs, F. G., Major late 1st Lond. Art. V.
 Dodgson, D. S., CB., Gen. late Ben. Inf.
 Donald, C. G., Capt. Rl. Fus.
 Doncaster, J. B., Lt.-Col. late R. Highrs.
 Donne, B. D. A., Major R. Sussex Regt.
 Dorchester, LORD, Col. late Cold. Gds.
 Dorner, LORD, Capt. late 74th Highrs.
 Dorville, John W., Adm. (retd.)
 Douglas, G. P., Capt. 2nd Drag. Gds.
 Douglas, H. M. S., Lt.-Col. late Oxf. L.I.
 Douglas, J. D., Major R.A.
 Douglas, J. S., Capt. R.A.
 Douglas, R. Gordon, Vice-Adm.
 Douglas, *Sir* Robt. Percy, *Bart.*, Gen., Col. 2nd Bn. N. Staff, Regt.
 Douglas-Hamilton, A. D., Lieut. R.N.
 Dowding, Herbert W., Capt. R.N.
 Dowell, *Sir* W. M., KCB., Adm.
 Downe, H. R., **VISCOUNT**, CIE., Lt.-Col. 10th Huss.
 Downes, C. V. S., Major E. Lanc. Regt. and Adj. 2nd V. B. S. W. Bord.
 Downing, C. M. H., Major R.A.
 Dowse, E. C., Major 1st Bn. Derby. Regt.
 Dowse, R. T. E., Major 2nd Bn. Suff. Regt.

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Dowson, C. S., Col. late 10th Regt.
 Doyle, A. H. J., Capt. Shrop. L.I.
 Drake, *Sir* F. G. A. Fuller-Elliott, *Bart.*,
 Capt. late R. H. Gds.
 *Drake, J. M. C., CB., Maj.-Gen. late R.E.
 Drayson, A. W., Maj.-Gen. late R.A.
 Drew, F. B., CB., Maj.-Gen. late W. York
 Regt.
 Drew, Geo., Col. 1st. Lon. Eng. Vols.
 Druitt, P. S., Capt. R. Mun. Fus.
 Drummond, A. S., Capt. S. Gds.
 Drummond, Edgar A., late Lt. R.N.
 Drummond, J. W. A., Major Scots Gds.
 Drury, E. D., Col. 2nd V.B. Rl. W. K. Regt.
 du Boulay, D. de la M., Capt. 7th Dr. Gds.
 du Boulay, N. W. H., Capt. R.A.
 Ducie, EARL, Lord Lieut. of Gloucester
 Duckworth-King, *Sir* George St. Vincent,
Bart., KCB., Adm.
 Dugdale, A. G., Major late R.A.
 Duke, O. T., Major 5th Bn. Rif. Bde.
 du Maurier, G. L. B., Lieut. Rl. Fus.
 Dumber, W. M., Col. late 24th Regt.
 Duncan, Andrew H. F., late Lieut. R.N.
 Duncan, J., Col. late R. Dub. Fus.
 *Duncan, P., Col. late 2nd Bde. S. I. Div.
 R.A.
 Duncombe, C. W., Col. late 1st Life Gds.
 Dundas, Colin M., Comr. (retd.) R.N.
 Dundas, R., Capt. Scots Gds.
 Dundas, Thomas, Maj. late 12th Regt.
 Dundonald, EARL of, Col. 2nd Life Gds.
 Dunne, J. H., Maj.-Gen. late 99th Ft.
 Dunsterville, L.D'A., Maj.-Gen. late Bom. S.C.
 du Plat Taylor, J. L., CB., Col. 24th Middx.
 R.V.
 Du Plat Taylor, St. J. L. H., Lieut. R.A.
 Durie, Charles, Lt.-Col.
 Durnford, A. G., late Col. R.E.
 Du Vernet, F. T. C., Lt.-Col. late Essex
 Regt.
 Dwyer, L. F. W., Major R. Anglesey Eng.
 Mil.

EARDLEY-WILMOT, A., Capt. R.A.
 Eardley-Wilmot, R., Col. 14th Ben. Lancers.
 *Eardley-Wilmot, S. M., Capt. R.N.
 Eardley-Wilmot, W. A., Lt.-Col. late
 North'd. Fus.
 *East, Cecil J., C.B., Maj.-Gen. late 57th
 Regt.
 East, James W., Rear-Adm. (retd.) R.N.
 Eaton, *Hon.* H. F., Col. Gren. Gds.
 Eden, M. R., Col.
 Edgecumbe, *Hon.* C. E., Col. 5th Bn. Rl.
 Fus., Col. late Gr. Gds.
 Edgell, E. A., Lieut. R.E.
 Edmeades, H., Maj.-Gen. late R.A.
 Edmonds, R., Capt. late 4th Kent R. V.
 *Edwards, J. B., CB., Maj.-Gen. late R.E.
 Edwards, R. F., Lieut. R.E.
 Egan, M. H., Lieut. Lothian Regt.
 Egerton, Alfred M., Col. late R. H. Gds.
 *Egerton, *Hon.* Francis, Adm. (retd.)
 Egerton, F. P., Capt. (retd.) R.N.
 *Egerton, F. W., Capt. (retd.) R.N.

Egerton, G. Le C., Comr. R.N.
 Egerton, R., Capt. W. Ind. Regt.
 Elgee, C. W., CB., Maj.-Gen. late R.A.
 Elias, Robert, Lt.-Col. late E. Lan. Regt.
 Eliot, *Hon.* C. G. C., Col. 3rd Bn. D. of
 Corn. L.I.
 *Elles, W. K., CB., Col. late 38th Regt.,
ADC. to the Queen.
 Ellice, E. C., Capt. Gren. Gds.
 Elliot, *Hon.* *Sir* Charles G. J. B., KCB.,
 Admiral of the Fleet.
 Elliot, H. M., Lieut. R.A.
 Elliot, *Sir* George, KCB., Admiral (retd.)
 Elliot, W. H., Maj.-Gen. late R.A.
 Elliott, G. H., Lt.-Col. Bengal S. C.
 Ellis, A. G., Lieut. 3rd Middx. A. V.
 Ellis, C. H. F., Col. late R.A.
 Ellis, Fred., Capt. late 9th Lancers.
 Ellis, William, Adm. (retd.)
 Ellison, R. G., Lt.-Col. 2nd V. B. Line.
 Regt. late Maj. 9th Lancers.
 Elmslie, F. B., Capt. R.A.
 Elrington, F. R., CB., Gen.
 Elrington, W. F., Col. late Scots Gds.
 Elsdale, H., Major R.E.
 Elverson, H. J., Capt. R. W. Surr. Regt.
 Elwes, W. C. C., Capt. late 71st H. L. I.
 Emerson, A. L., Maj.-Gen. late 1st. Bn.
 Glouc. Regt.
 Enthoven, C. H., Lieut. R.E.
 Errington, A. C., Gen., Col. York L. I.
 Erskine, Geo., Gen., Col. Arg. and Suthd.
 High'rs.
 Erskine, J. F., Lieut. Scots Gds.
 Ethelston, Alfred P., Lieut. R.N.
 Evans, E. T., Col. late Lanc. Fus.
 Evans, H. J., Capt. L'pool Regt.
 Evans, H. Lloyd, Lt.-Col. late Indian
 Army
 Evans, H. T. P., Major E. Lan. Regt.
 Evans, John, Col. late 1st V.B. Derby.
 Regt., Capt. late 6th Innis. Drs.
 Evans, S. T. G., Capt. late Eton R.V.
 Evans, U. W., Lieut. R.E.
 Evantural, A., Lt.-Col. 9th Batt. Rifles,
 "Voltigeurs de Quebec"
 Eveleigh, C. N., Capt. Duke of Corn. L.I.
 Eveleigh, G. C., Capt. late R.A.
 Everard, H. E. E., Major 3rd Bn. Worces.
 Regt.
 Everett, H. J., Lieut. Som. L. I.
 Ewart, *Sir* H. P., KCB., Maj.-Gen. late 2nd
 Life Gds.
 Ewart, *Sir* J. A., KCB., Gen., Col. 2nd Bn.
 Gord. Highrs.
 Ewart, W. S., Lt.-Col. late Gren. Gds.
 Exeter, MARQUIS of, Col. 3rd Bn. North'n.
 Regt., *ADC. to the Queen*

FAGAN, C. S. F., Major R. M. L. I.
 Fairholme, Chas., Capt. (retd.) R.N.
 Falkland, VISCOUNT, Lt.-Col. late Royal
 Suss. Regt.
 Falmouth, Visct., C.B., Col. Cold. Gds.
 Fanshawe, Charles, Gen. R.E.
 Fanshawe, F. B., Capt. Rl. W. Kent Regt.

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*Farquhar, *Sir* Arthur, KCB., Adm. (retd.)
 Farquhar, F. G., Lt.-Col. late 2nd Drs.
 Farquharson, J., Lt.-Col. R.E.
 Farr, William, Lieut. R.N.
 Farren, R. T., CB., Gen., Col. 1st Bn. L.
 N. Lan. Regt.
 Farrell, J. D. C., Col. 3rd V. B. R. W. K.
 Regt.
 Farrer, F., Capt. (retd.)
 Farrington, H. D'O., Col. Comg. 6th Regtl.
 Dist., late 2nd Bn. R. Highrs.
 *Farrington, M. C., CB. Col. late S. York.
 Regt.
 Favell, T. M., Capt. Shrops. and Staffords.
 Art. Vol.
 Fawkes, L. G., Major R.A.
 Fawkes, Wilmot H., Capt. R.N.
 Fearon, J. A., Capt. York. Regt.
 Featherstonhaugh, A., Lt.-Col. R.E.
 Feilden, G. C., Lieut. Seaf. Highrs.
 Feilden, R. J., CMG., MP., Lt.-Gen.
 Feilding, *Hon.* W. H. A., Lieut.-Gen. late
 Colds. Gds.
 Feldtmann, H., Capt. 1st Cumb. Art. V.
 Fellowes, J., Col. R.E.
 Fellowes, P. H., Gen.
 Fenning, S. W., Lt.-Col. late Ben Art.
 Fenwick, N. E. de B., Major late K. R.
 Rif. C.
 Fergusson, J., Major late R. I. Fus.
 Fergusson, H. J., Capt. Sco. Rifles.
 Fergusson, J. A., Major Rif. Brig.
 Festing, M. M. M., Capt. late 20th Regt.
 Field, *Æsculapius*, late Hon. Corps Gentle-
 men-at-Arms
 Field, W. H., Col. late 15th Hus.
 Fife-Cookson, J. C., Lt.-Col. late 65th
 Regt.
 *Finch, W. J., Maj.-Gen. late R.A.
 Firebrace, F., Lt.-Col. R.E.
 Fischer, J. F., Gen. R.E.
 Fitz-Gerald, C. C. P., Capt. R.N.
 Fitz-Gerald, *Lord* Fredk., Major K. R. Rif. C.
 Fitz Gerald, James, Col. late Ben. S. C.
 Fitz Roy, C. C., Maj. late 68th L. I.
 Fitz Roy, E. A., Lt.-Col. R.A.
 Fitz Roy, P., Col. late Northd. Fus.
 *Fitz Roy, Robert O'B., CB., Rear-Adm.
 Fleming, Geo., CB., Princ. Veterinary Surg.
 Flood, H., Lt.-Col. late 2nd Queen's Regt.
 *Flower, L., Major late 4th Bn. E. Sur.
 Regt.
 Foley, *Hon.* *Sir* St. G. G., KCB., Gen., Col.
 2nd Bn. S. Staff. Regt.
 Follett, R. W. W., Col. Cold. Gds.
 Foord, E. A., Lt.-Gen. late R.E.
 Foote, F. O. B., Major R.A.
 Foran, J. C., Major 2nd Vol. Bde. Cing.
 Ports Div. R.A.
 Forbes, G. W., Capt. 1st Drag. Gds.
 Forbes, *Sir* John, KCB., Gen. late Bo. Cav.
 Forbes, S., Lt.-Col. late 3rd Bn. E. Sur.
 Regt.
 *Forbes, *Hon.* W. F., Col. late 8th Bn. Rif.
 Brig.
 Ford, E. T., Maj.-Gen. late R.E.
 Forester, *Hon.* H. T., Lt.-Col. late Gr. Gds.

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Fornaby, J., Major 3rd V. B. L'pool Regt.
 Forster, B. L., Maj.-Gen. late R.A.
 Forster, C., Lt.-Col. 3rd Bn. N. Staff. R.
 Forster, F. R., Lt.-Col. late 4th R. I. D.
 Gds.
 Forster, J. Fitz E., Col. late D. of Corn.
 L.I.
 Forster, Wm., Major 7th Bn. late 3rd Bn.
 K. R. Rif. C.
 Forsyth, T. H., Col. late Wilts. Regt.
 Fortescue, *Hon.* L. H. D., Capt. 17th Lanc.
 Fortescue, Francis, Capt. late Sco. Gds.
 *Foster, C. E., Col. Comg. 48th Regtl. Dist.
 late Northn. Regt.
 Foster, Chas. J., CB., Gen., Col. 16th Lancers
 Foster, H. J., Capt. R.E.
 Foster, J., Capt. late Gren. Gds.
 *Foster, K. O., Major late 4th Bn. S. Staff.
 Regt.
 Fowler, F. C., Lieut. R.A.
 Fowler, F. J., Lieut. Bom. S.C.
 Fox, Edwin, Capt. late H.A.C.
 *Fox, L. L. B., Maj. late 6th Bn. Rif. Brig.
 Fox, Maxwell, Capt. (retd.) R.N.
 Fox, W. R., Lt.-Col. late R.A.
 Fox-Strangways, T. S., Lieut. R. I. Rifles
 *Frampton, W. J., Col. Comdg. 30th
 Regtl. District, late E. Lan. Regt.
 Frankfort, Visct., Maj.-Gen. late 32nd Foot
 Frankland, C., Col. late R. Dub. Fus.
 Franken, C. R., Lt.-Col. late R.A.
 Fraser, Charles C., *W.C.*, CB., MP., Lt.-
 Gen., Col. 8th Hussars
 Fraser, H. A. D., Lieut. R.E.
 Fraser, *Hon.* H. T., Col. late S. Gds.
 Fraser, J. Keith, CMG., Maj.-Gen. late
 1st Life Gds.
 Fraser, W. J., late Lieut. 1st T. H. Eng.
 Vols.
 Frederick, C. A. A., Lieut. Cold. Gds.
 Freeland, J., Major 1st V. B. R. W. Sur.
 Regt.
 Freeland, R. G., late Ens. 4th K. O. Regt.
 Freeth, S., Maj.-Gen. late R.E.
 Fremantle, Fitz R. W., CB., Col. Comdg.
 11th Regtl. Dist., late Cold. Gds.
 French, J. D. P., Col. 19th Huss.
 French, P. T., Lt.-Col. late Bomb. Army
 Frome, Edw., Gen., Col. Comdt. R.E.
 *Fryer, J., CB., Col. late 6th Drag. Gds.
 Fuller, C. B., Gen. late R.A.
 Fullerton, A. G., Major late R. H. Gds.
 Fullerton, A. G., Comr. R.N.
 Furse, G. A., CB., Col. late 42nd Highrs.
 Fyers, *Sir* William A., KCB., Lt.-Gen.

-GAGE, *Æ.* M. B., Lieut. 2nd Bn. E. K. Regt.
 Gallie, J. B., Major 7th V. B. K. R. R. Corps.
 Galloway, *Earl* of, KT., Col. Comdt. 3rd Bn.
 R. S. Fus.
 Galloway, Edwin J. P., Comr. R.N.
 Galloway, *Sir* T. L. J., KCMG., Lt.-Gen.
 late R.E.
 *Galton, *Sir* Douglas, KCB., FRS., Capt. late
 R.F.
 Gamble, D., CB., Col. 2nd V.B. S. Lanc. R.

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Gammell, J. H. H., Col. late 54th Regt.
 Garbett, H. J. G., Comr. R.N.
 *Gardiner, Chas. G., Lieut. R.N.
 Gardiner, S., Lt.-Col. R.A.
 Gardner, G. H., Rear-Adm. (retd.)
 Gardner, T., Lt.-Col. late 3rd Bn. L'pool Regt.
 *Garnham, R. E. W., Lt.-Col. late 3rd Bn. W. Rid. Regt.
 Garratt, J. A. T., Lt.-Col. late Gren. Gds.
 Gartside-Tippinge, E. A., Capt. R.A.
 Gascoigne, Clifton, Lt.-Col. late Gren. Gds.
 Gascoigne, W. J., Col. Scots Gds.
 Gatacre, W. F., DSO., Col. (h.p.) late 2nd Bn. Middx. Regt.
 Gathorne-Hardy, *Hon.* C. G., Col. late Gr. Gds.
 Gatcliff, A. F., Capt. R.M.L.I.
 Gaulter, H. E., Major 1st Bn. Hamps. Regt.
 Gawne, J. M., Capt. R. Lanc. Regt.
 Gaynor, H. F., Lieut. R.E.
 Geach, G. B., Lieut. 4th Dr. Gds.
 Geary, H. Le G., Col. (h.p.) late R.A.
 Gellie, Francis, Maj.-Gen. late 39th Ben. N. I.
 George, O. W., MD., Brig.-Surg. late 1st Life Gds.
 Gethin, J. P., Capt. Manc. Regt.
 *Gibbons, Charles, Capt. R.N. (retd.)
 Gibbs, J. R., Lt.-Col. late R. War. Regt.
 Gibson, J. M., Major Flint Eng. Vols.
 Gilbert, W. R., late Chaplain R.N.
 Gill, F., Major late 21st Middx. R.V.
 Gillespie, R. R., CB., Maj.-Gen. late 106th Bom. L.I.
 Gillett, A. W., Rear-Adm. (retd.)
 Gillett, Henry, Lt.-Col. late Som. L. I.
 Gillett, W., Capt. late Uxbridge Yeo.
 Gipps, H., Major late 9th Regt.
 Gipps, *Sir* R., KCB., Maj.-Gen. late Scots Gds.
 *Girardot, G. C., Maj.-Gen. late Durh. L.I.
 Gissing, Charles E., Capt. R.N.
 Given, Butler M., Capt. late 10th Huss.
 Gladstone, Chas. E., Lieut. R.N.
 Gladstone, *Sir* J. R., *Bart.*, Capt. (h.p.) late Cold. Gds.
 Glasgow, J. C. R., Major Suff. Regt.
 Glasspoole, W. A., Col. late Bo. S. C.
 Glen, A., Capt. 14th Middx. R.V.
 Glennie, F., Lt.-Col. S. Wales Bord.
 Glentworth, VISCOUNT, Lieut. 4th Bn. Rifle Brig.
 Glossop, W. D., late Lieut. 2nd Derby R.V.
 Glyn, A. St. L., Lieut. 3rd Bn. R. Fus.
 Glyn, J. P. C., Major-Gen. late Rif. Bde.
 Glyn, R. T., CB., CMG., Lt.-Gen. late 24th Regt.
 Glyn, *Sir* Rich. G., *Bart.*, Capt. late 1st R. Dragoons
 Glyn, *Hon.* Sidney Carr, Capt. late Rifle Brig.
 Godfray, J. W., Major K.O. Seo. Bord.
 Godsal, P. T., Major 4th V. B. Oxf. L. I.
 Godwin, A. A., Lt.-Col. late 2nd Bn. R. Dub. Fus.

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Godwin-Austen, H. H., Lt.-Col. late Ben. S. C.
 Goff, Robert Charles, Col. late Cold. Gds.
 Goldfrap, H. C. S., Capt. Line. Regt.
 Goldsmid, A. E. W., Lt.-Col. late R. Mun. Fus.
 Goldsmid, *Sir* Frederic J., KCSI., CB., Maj.-Gen. late I.A.
 *Goldsworthy, W. T., Maj.-Gen., MP., late Essex Regt.
 Goodall, George, Lieut. late R.E.
 Goodenough, W. H., C.B., Maj.-Gen. R.A.
 Goodlake, G. L., *U.C.*, Lt.-Gen.
 Goodman, G. D., Lieut. 1st V.B. N. Staff. Regt.
 Goodwyn, J. E., Major E. Lan. Regt.
 Goolden, G. B., Comr. (retd.) R.N.
 Gordon, A. W., Maj.-Gen. late 61st Regt.
 Gordon, C. H., Capt. E. Kent Regt.
 Gordon, C. S. S. E., Maj.-Gen. late 23rd Regt.
 Gordon, E. C. A., Maj.-Gen. late R.E.
 *Gordon, J. J. H., CB., Maj.-Gen. Beng. S.C.
 Gordon, W. C., Dep. Commissary.
 Gordon, W. E., Rear-Adm.
 Gordon-Cumming, *Sir* W. G., *Bart.*, Lt.-Col. S. Gds.
 Gordon-Gilmour, R. G., Lieut. Gren. Gds.
 Gordon-Lennox, LORD A. C., Col. late Gren. Gds.
 Gore, *Hon.* G. R. C. O., late Lieut. Cold Gds.
 Gore, St. G. C., Major R.E.
 Gore-Booth, J., Lt.-Col. R.E.
 *Gort, S. P., VISCOUNT, *Hon.* Col. Limerick City Arty. (S. Div. R.A.)
 Gosset, E. A. G., Capt. Derbys. Regt.
 Gosset, E. F., Capt. E. York. Regt.
 Gosset, W. D., Maj.-Gen. late R.E.
 Gough, *Hon.* G. H., Lt.-Col. 14th Huss.
 Goulburn, H., Capt. Gren. Gds.
 Gould, H. C., Col. 3rd Bn. Welsh R.
 Graham, D. A. G. C., Lt.-Col. late 6th Dr. Gds.
 Graham, *Sir* Gerald, *U.C.*, GCMG., KCB., Lt.-Gen. R.E.
 Graham, J., Lt.-Col. late 4th Bde. Welsh Div. R.A.
 Graham, *Sir* Lumley, *Bart.*, Col.
 Graham, T. P., Col. late S. Gds.
 Grant, *Sir* Arthur H., *Bart.*, late Lt. 27th Regt.
 Grant, Henry D., CB., Vice-Adm.
 Grant, John M., Col. late R.E.
 Grant, J. M., Major C. M. Riflemen
 Grant, R., CB., Col. (h.p.) R.E.
 Grattan, A. O'D., Col. late R.E.
 Graves-Sawle, F. A., Col. Cold. Gds.
 Gray, Basil, Major ret. pay
 Gray, H. W., Col. 2nd Middlesex R.V.
 Gray, P. E., Lieut. R.A.
 Gray, Scott W. A. H., Lieut. R.N.
 Gray, W., Col. 2nd V. B. L. N. Lan. Regt.
 Gray, W. J., Lt.-Gen. late R.A.
 Graydon, Geo., Maj.-Gen. late R.A.
 Greaves, *Sir* G. R., KCB., KCMG., Maj.-Gen.

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Green, A., Col. late Rifle Brigade
 Green, M. S., CB., Col. late Bomb. S. C.
 Green, *Sir* W. H. R., KCSI., CB., Maj.-Gen.
 late Bomb. S. C.
 Greene, W. G., Esq., Admiralty
 Greenhill, B. C., Major late 2nd Brig.
 Cinque Ports Div. R.A.
 Greenwood, J., Major 2nd Middx. Art. Vols.
 Greet, T. Y., Lieut. R.N.
 Greg, E. H., Capt. late 4th R. Lanc. Mil.
 Gregory, *Sir* C. H., KCMG., Col. Eng. and
 Rail. Vol. Staff Corps
 Gregory, G. B., Capt. late 57th Middx. R.V.
 *Gregson, J. D., Col. late S. Yorks. Regt.
 Gregson, M. H., Capt. late R.E.
 Grenfell, Harry T., Capt. R.N.
 Grenville-Grey, G., Capt. 3rd Middx. Art.
 Vol.
 Greville, A. C., Lt.-Col. late Cold. Gds.
 Greville, *Hon.* A. H. F., Capt. late K. R.
 Rif. C.
 Grey, *Hon.* George, Adm. (retld.)
 Grierson, J. M., Capt. R.A.
 Grieve, F., Col. late D. of Corn. L. I.
 Griffin, E. J., Lieut. R.N.R.
 Griffin, R. C., Lieut. Suss. Arty. (E. Div.
 R.A.)
 Griffith, G. H., Lieut. R.E.
 Griffith, E. H., Capt. Leic. Regt.
 Griffiths, A. G. F., Maj. late 63rd Regt.
 *Griffiths, E. St. J., Col. late 19th Regt.
 Grimston, W. J., Major late R.A.
 Grove, C., CB., Col. late E. York Regt.
 Grove, E. A. W. S., Maj. Rl. W. Kent Regt.
 Grover, M. H. S., Capt. Mad. S. C.
 Gubbins, J., CB., Lt.-Gen.
 Guilding, E. L., Capt. Essex Regt.
 Guinness, B. Lee, Capt. late R.H. Gas.
 Guise, J. C., *U.C.*, CB., Lt.-Gen.
 Gunning, R. H., Capt. K's R. Rif. Corps.
 *Gunter, E., Lt.-Col. late E. Lan. R.
 Gunter, H., Major Rl. Hignrs.
 Guyon, H. J., Capt. E. Yorks. Regt.
 Gwatkin, W. G., Lieut. 1st Bn. Manch.
 Regt.
 Gwyn, A., Capt. Ind. Marine Service.

HADAWAY, G. R., Major R.A.
 Haddan, F. W., Lt.-Col. 4th V.B. Rl.
 W. Sur. Regt.
 Haines, B. G., Major 4th Bn. E. Surr.
 Regt.
 Haines, *Sir* F. P., GCB., GCSI., CIE.,
 Gen., Col. R. Mun. Fus.
 Haldane, G. H. J., Lt.-Col. late 64th Regt.
 *Hale, Lonsdale A., Col. late R.E.
 *Hale, M. H., Col. late 1st Bn. Sco. Rif.
 Hale, R., Maj.-Gen. late 7th Huss.
 Halford, C. H., Lieut. Gren. Gds.
 Hall, B. G., Lt.-Col. R.M.A.
 Hall, C. McK., Col., late Ben. Army
 Hall, E. C., Comr. (retld.) R.N.
 Hall, F. H., Major R.A.
 Hall, G. F. King, Comr. R.N.
 Hall, H., Major late 15th Hussars

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Hall, H. G. King, Lieut. R.N.
 Hall, J. H., Maj.-Gen. late Cold. Gds.
 *Hall, M., Col. late 1st Bn. R. Mun. Fus.
 Hall, T. E. A., Col. late 49th Regt.
 Hall, W. B. R., Col. (h.p.) R.A.
 Hallett, J. A., Navy Agent
 Hallowell, H. L., Capt. Loth. Regt.
 Halpin, A. F., late Lieut. Lon. I. Rifles
 Halpin, Geo., Col. late Madras S. C.
 Haly, R. H. O'G., DSO., Col. 1st Bn. Suff.
 Regt.
 Hamilton, A. B., Lieut. K. O. Sco. Bord.
 Hamilton, A. C., Col. late R.E.
 Hamilton, E. O. F., Capt. R. W. Sur. Regt.
 Hamilton, *Sir* Fred. Wm., KCB., Gen., Col.
 R. Scots Fus.
 *Hamilton of Dalzell, LORD, Col. late Q. O.
 Glasgow Yeo., late 2nd L. Gds.
 Hamilton, J. J., Major L'pool Regt.
 Hamilton, P. F. P., Major R.A.
 Hamilton, R. G., Gen., Col. Comdt. R.E.
 Hamilton, S. B., Capt. late 11th Hussars
 Hamilton, *Sir* R. V., KCB., Adm.
 Hamilton, *Sir* Wm. S., *Bt.*, Lieut.-Gen. R.A.
 Hamilton, W. A. B., CMG., Major Loth.
 and Berwicks. Yeo. Cav.
 Hamilton, W. G., Capt. E. Lan. Regt.
 Hamilton-Gordon, *Hon.* *Sir* Alex., KCB.,
 Gen., Col. Leins. Regt.
 Hamilton-Grace, S., Col. late 68th Regt.
 Hamley, *Sir* E. B., K.C.B., KCMG., MP.
 Lt.-Gen. R.A.
 Hammersley, Chas., Army Agent
 Hammersley, Fred., Maj.-Gen. late 14th
 Foot
 Hammick, *Sir* St. V. A., *Bart.*, Lt.-Col. late
 Oxf. L. I.
 Hamond, R. H., Capt. R.N.
 Hanbury, E. E., Lieut. Sco. Gds.
 Hand, J. S., CB., Col. late Essex Regt.
 Hanford-Flood, J. C., Col. 19th Huss.
 Hankey, F. A., Capt. late Queen's Westmr.
 R.V.
 Hankin, Geo. C., CB., Lieut.-Gen. late Ben.
 S. C.
 Harbord, *Hon.* C., Capt. Sco. Gds.
 Harbord, the *Rev.* J. B., R.N., Chaplain of
 the Fleet (retld.)
 Hardie, G. K., MD., Dept. I.-Gen. of Hosptls.
 *Hardie, H. R., Major late 3rd Bde. Sco.
 Div. R.A.
 *Harding, C., FRGS., Hon. Col. 4th V. B.
 Rl. W. Surrey Regt.
 Hardinge, *Hon.* *Sir* A. E., KCB., CIE.,
 Gen., Col.-Comdt. K's Rl. Rifle Corps.
 *Hardinge, C. S., Viscount, Col. 1st V. B.
 R. W. Kent Regt., *ADC. to the Queen*
 Hardinge, *Hon.* George A., Lieut. R.N.
 Hardinge, *Hon.* H. C., Capt. Rif. Bde.
 Hardy, F., Maj.-Gen. late 84th Regt.
 Hare, H., Major R. Mun. Fus.
 Hare, W. A. H., Major R.E.
 Harford, F. L., Major 2nd Bn. Worc. Regt.
 Harington, E. C., Lieut. R.A.
 Harington-Stuart, R. E. S., Col. 2nd
 V.B. Sco. Rif., Capt. late Rifle Brigade
 Harkness, J. G., Maj.-Gen. late Northd. Fus.

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Harlech, LORD, Major late 19th Lt. Drs.
 Harness, A., CB., Col. (h.p.) R.A.
 Harnett, E., Maj.-Gen. late 7th R. Dr. Gds.
 Harris, Charles R., Comr. (ret'd.) R.N.
 Harris, C. S., Capt. York and Lanc. Regt.
 Harris, R. H., Capt. R.N.
 Harrison, T., Lieut. R.E.
 Harrold, A. L., Major S. Australian Mil.
 Hart, J., Lt.-Col. late Leins. Regt.
 Hatchell, G., Col. Comdg. Rif. Dep. late
 K. R. Rif. C.
 Hatton, Villiers, Lt.-Col. Gr. Gds.
 Havelock-Allan, *Sir* Hen. M., *Bart.*, *U.C.*,
 KCB., MP., Lt.-Gen., Col. Durham Arty.
 (W. Div. R.A.)
 Hawes, G. H., Maj.-Gen. late 9th Regt.
 Hawkshaw, *Sir* John, Col. Comdt Eng.
 and Rail. Vol. Staff Corps
 Hawkshaw, H. B., Lieut. R.N.
 Haworth, F., Lt.-Col. 3rd V.B. Lan. Fus.
 Hay, *Rt. Hon.* LORD John, GCB., Adm. of
 the Fleet.
 Hay, J. C., CB., Maj.-Gen. late Gord.
 Highrs.
 Hay, *Sir* J. A., *Bart.*, late Lieut. Scots Gds.
 Haye, J. B., Comr. R.N.
 Haynes, A. E., Capt. R.E.
 Hayter, *Sir* A. D., *Bt.*, Lt.-Col. late London
 Rifle Brigade
 Hayward, H. B., Maj.-Gen. late Derbys.
 Regt.
 Head, H. S., Lieut. 4th Battn. Worcester
 Regt.
 Heal, Harris, late Capt. 4th Middx. R. Vols.
 Healy, R. C., Com.-Gen.
 Hearle, Perkins, Major R.M.L.I.
 Heastey, G. B., Maj.-Gen. late R.M.
 Heath, *Sir* Leopold G., KCB., Adm. (ret'd.)
 *Heathorn, T. B., Capt. (h.p.) R.A.
 Hector, J., MB., Brig.-Surg. (ret'd.) M.S.
 Hegan, E., Major 5th Drag. Gds.
 Hemphill, F. B. R., Capt. Rl. Berks Regt.
 Henderson, *Sir* E. Y. W., KCB., Lt.-Col.
 late R.E.
 Henderson, F. H., Comr. R.N.
 Henderson, G. F. R., Major York and Lanc.
 Regt.
 Hendrie, J. S., Capt. Canadian Arty.
 Helby, Edward C. H., Lieut. R.N.
 Heneage, A. C. F., R.-Adm.
 Henniker-Major, *Hon.* A. H., Capt. Cold.
 Gds.
 Henry, C. S., CB., Lt.-Gen. R.A.
 Henry, G. C., Col. late R.A.
 Henty, A., Major 2nd V.B. Rl. Suss. Regt.
 Hepper, A. J., DSO., Lt.-Col. R.E.
 Herapath, E., Capt. Linc. Regt.
 Herbert, *Sir* Arthur J., KCB., Gen.
 Herbert, E. B., Capt. 17th Lancers
 Herbert, F. A., Vice-Adm. (ret'd.)
 Herbert, *Hon.* W. H., Maj.-Gen.
 Hercy, J. E., Lieut. Sco. Gds.
 Hereford, Chas., Maj.-Gen. late York Regt.
 Hewett, George H., Lieut. R.N.
 Heyland, A. T., CB., Gen., Col. W. Yorks.
 Regt.
 Heyland, H. K., Lieut. (ret'd.) R.N.

1208

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Heywood, J. M., Col. R.E.
 Hickson, R. A., Major E. Kent Regt.
 Higgins, W. F., late Colonial and War
 Depts.
 Higginson, C. T. M., Col. late 2nd Ben. Cav.
 Higginson, *Sir* George W. A., KCB., Lt.-
 Gen.
 Hill, A., Major 3rd Bn. Ches. Regt.
 Hill, H. B., Lieut. R.A.
 Hill, J., Lt.-Col. late R.E.
 Hill, J. T., Gen., Col. 1st Bn. Gord. Highrs.
 Hill, Rowland, Lt.-Col. 1st Battn. Dorset.
 Regt.
 Hill, *Sir* Stephen J., KCMG., CB., Col.
 Hill, T., Capt. late 11th Regt.
 Hill, T. A., Capt. 12th Lancers
 Hills, E. H., Lieut. R. E.
 Hills, John, CB., Maj.-Gen. late R.E.
 Hills-Johnes, *Sir* Jas., *U.C.*, KCB., Lt.-
 Gen. R.A.
 Hillyard, G. A., Lt.-Col. Rif. Brig.
 Hime, F., Major-Gen. late R.E.
 *Hime, H. W. L., Lt.-Col. R.A. **GOLD**
Medallist, Military Essay, 1875
 Hire, A. H., Lieut. R. M. A.
 Hirst, T. E., Capt. 2nd V. B. W. Rid. Regt.
 Hoare, A. F., Capt. 1st V. B. Bedf. R.
 Hobart, G. B. B., Col. (h.p.) late R.A.
 Hobson, F. T., Col. Com. 3rd Regtl. Dist.
 late E. Kent Regt.
 Hogg, J. R., Col. late R.E.
 Holden, H., Lt.-Col. late 13th Light Drs.
 *Holden, Robt., Capt. 4th Bn. Worc. Regt.
 Holdsworth, J. K., Col. (h.p.) R.A.
 Holland, A. G., Major 15th Huss.
 Hollingsworth, T. S., Dep. Surg.-Gen.,
 M.S.
 Hollway, C., Lt.-Col. late 91st Highrs.
 Holmes, A. L'E. H., Col. Ben. S. C.
 *Home, D. M., Col. late R. H. Gds.
 Home, *Hon.* W. S. D., Col. late Gr. Gds.
 Hood, A. A., late Lieut. Rifle Bde.
 Hood, B. C., Lieut. Yorks. Regt.
 Hood, F. W., VISCOUNT, Lt.-Col. late Gr.
 Gds.
 Hood, W. C., Col. R. W. Surr. Regt.
 Hood, W. H., Comr. (ret'd.) R.N.
 Hooke, H. H., Lt.-Col. 1st Bn. The Sher-
 wood Foresters (Derby. Regt.)
 Hoole, A. S., late Lieut. R.A.
 Hooper, W. E. P., Esq., FRGS., Admiralty
 Hope, C., Capt. late K. R. Rif. C.
 Hope, H. R., Col. Madras Cavalry
 Hope, Richard W., Comr. R.N.
 Hope, W., *U.C.*, Lt.-Col., Comdt. 1st City
 of Lon. Art. V.
 Hope-Edwards, H. J., Lt.-Col. late K. R.
 Rif. C.
 Hopkins, J. O., R.-Adm.
 Hornby, L., Col. E. Surrey Regt.
 Horne, C. J., Maj.-Gen. late Bedf. Regt.
 Horne, H. S., Capt. R.A.
 Horsford, N. M. T., Col. Ben. S.C.
 Hoskyns, C., Major R.E.
 Hoste, Geo. H., late Lieut. Civil Service
 R.V.
 Iiotham, Charles F., CB., Rear-Adm.

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Howard, F. C., Major Rif. Brig.
 Howard, H. R., Capt. late 2nd Herts R. V.
 Howe, EARL, CB., Gen., Col. Leic. Regt.
 Howlett, A., Major Madras S. Corps.
 Hudson, A. T. P., Capt. Manch. Regt.
 Hughes, E., CB., CMG., Col. A.S. Corps.
 Hughes-Hallett, H. T., Major Middx. Regt.
 Hull, Thos. A., Comr. (ret'd.) R.N.
 Hulton, E. G., Capt. R.N.
 Hume, Henry, CB., Col. late Gr. Gds.
 Hume-Spry, G. F., MD., Surg.-Maj. 2nd Life Gds.
 Humfrey, T. B., Major L'pool Regt.
 Hummel, H. W., Lt.-Col. 15th Middx. R.V.
 Humphry, A. P., Lt.-Col. late 4th V. B. Suff. Regt.
 Humphry, E. W., Major (ret. pay) late R.E.
 *Hunt, Wm. G. F., FRGS., Assist. Paym. (ret'd.) R.N.
 Hunter, M., Maj.-Gen. late Beng. S. C.
 *Hunter, S. A., Lt.-Col., late 101st R. B. F.
 Hunter, W., Lt.-Col. R.A.
 Hurst, W. B., Lt.-Col. late R.E.
 Hutchins, A. G., Col. Mad. N. I.
 Hutchinson, A. J., late Lt. 23rd R. W. Fus.
 Hutchinson, C. S., Maj.-Gen. late R.E.
 Hutchinson, G., CB., C.S.I., Maj.-Gen.
 *Hutchinson, J., Hon. Col. 1st V. B. Lanc. Fus.
 Hutchinson, W. N., Gen., Col. W. R. Regt.
 Hutchison, H. McL., Lt.-Col. late W. Yorks. Regt.
 Hutton, A., Captain late 1st Drag. Gds.
 Hutton, C. M., Capt. Oxf. L. I.
 Hutton, H., Lt.-Col. 4th W. R. Y. Art. Vols.
 Hylton, LORD, Capt. late Cold. Gds.
 Hyslop, R. M., Major R.E.

IMPEY, A. G., Major R. Suss. Regt.
 Inches, C. J., Fleet Eng. (ret'd.) R.N.
 *Ingles, John, Capt. R.N.
 Ingles, W. L., Maj. late Bedf. Regt.
 Ingles-Chamberlayne, W. C., Capt. 2nd V. B. Glouc. R.
 Ingram, E. R. B., Major Welsh Regt.
 *Innes, J. J. McLeod, *U.C.*, Lt.-Gen. late R.E.
 Innes, P. R., Lt.-Col. late Ind. Military Forces.
 Irby, J. J. C., Maj., Adj. Chelsea Hosp.
 Ives, G. M., Col. 18th Middx. R.V.
 Izat, George, Comr. R.N.

*JACKSON, F. G., Col. R. Sc. Fus.
 Jackson, H. M., Capt. late R.A.
 Jackson, H. K., Capt. R.A.
 Jackson, L. C., Capt. R.E.
 Jackson, R., Major late 8th Huss.
 Jackson, T. S., Capt. R.N.
 Jacob, H. E., Maj.-Gen. late Bom. S. C.
 James, F. W., Major Norf. Regt.
 James, W., late Lieut. R.N.

1315

James, W. C., Major 2nd Drs.
 James, W. H., Capt. late R.E.
 Jarvis, S. P., CMG., Maj.-Gen. late 82nd Regt.
 Jary, R. H., Major late 12th Roy. Lancers
 Jazdowski, B. J., MB., Brig.-Surg. M.S.
 Jebb, A., Major late 4th Bn. Lincoln Regt.
 Jeffcock, J. W. G. P., Lieut. 19th Hus.
 Jeffreys, E. F., Capt. R.N.
 Jeffreys, R. D., Mid. R.N.
 Jeffreys, W. J. L., Lieut. Essex Regt.
 Jefferis, John, late Lieut. Madras Art.
 Jelf, R. H., Lt.-Col. R.E.
 Jenkins, Robt., CB., Adm. (ret'd.)
 Jephson, Alfred, Capt. (ret'd.) R.N.
 Jephson, J. H., MD., late Assist.-Surg. 49th Regt.
 Jervois, Sir W. F. D., GCMG., CB., Lt.-Gen. R.E.
 Jervoise, H. C., Lt.-Col. late Cold. Gds.
 Jervoise, J. P. E., Col. 3rd Huss.
 Jessel, H. M., Lieut. 17th Lancers.
 Jessop, T., Capt. late 2nd Drs.
 Jocelyn, J. R. J., Major R.A.
 Johnson, Cecil F. W., Capt. (ret'd.) R.N.
 Johnson, *Sir* E.B., GCB., CIE., Gen. R.A.
 Johnson, R. F., Major R.A.
 Johnson, R., Col. late Linc. Regt.
 Johnson, W. V., Capt. late 90th L. I.
 Johnston, D. A., Major R.E.
 Johnston, J. G., Capt. late R.E.
 Johnston, T. H., Gen., Col. Royal Berks. Regt.
 Johnstone, Fred. E., Capt. (ret'd.) R.N.
 Johnstone, J., Major Oxford. L. I.
 Johnstone, J. H. L'E., Lieut. R.E.
 Johnstone-Douglas, C. F., Maj. 5th Lancers
 Jones, C. J., late Admiralty.
 Jones, Harry, Lieut. R.N.
 Jones, H. L., Maj.-Gen. late R.A.
 Jones, H. S., CB., Maj.-Gen. R.M.L.I.
 Jones, *Sir* Lewis T., GCB., Adm. (ret'd.)
 Jones, M., Lt.-Col. H. A. C.
 Jones-Byrom, W. R., Lieut. 3rd Huss.
 Jones-Vaughan, H. T., Col. late E. York Regt.
 Jopp, A. A., Capt. late R.E.
 Jopp, K., Lt.-Col. late Bom. S. C.
 Jordan, J. D., Capt. 4th Middx. R.V.
 Josephs, W. D., Capt. 4th Middx. R.V.
 Judge, C. B., Capt. Ben. S.C.

KAYE, R. W., Lt.-Col. R.A.
 Keays-Young, H. W., Lt.-Col. late 18th R. Ir. Regt.
 Kebbel, W. H., Major
 Keighly-Peach, C. W., Lieut. R.N.
 Keirle, R., Capt. late 1st M. Art. Vols.
 Keith, W., Col. late R.E.
 Keith-Falconer, C. E., Lieut. Northd. Fus.
 Kellie, J., Capt. R.E.
 Kellie, R. H., Capt. 2nd Bn. S. Lan. Regt.
 Kelly, J. G., Lt.-Col. Beng. S.C.
 Kelly, *Sir* R. D., KCB., Gen., Col. 1st Bn. Bord. Regt.

1315

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Kemball, *Sir* A. B., KCB., KCSI., Gen. R.A.
 Kennedy, C., Major Suff. Regt.
 Kennedy, E. C. W. M., Lieut. Mad. S. C.
 Kennedy, W. R., Capt. R.N.
 Kennett-Barrington, *Sir* V. H., late Lieut.
 R. Elth. Mil.
 Kensington, LORD, Col. late Cold. Gds.
 Keppel, *Hon.* *Sir* H., GCB., Adm. of the
 Fleet
 Kerr, C. R., Major 1st Bn. R. Dub. Fus.
 Kerr, LORD Mark, KCB., Gen. Col. Som. L.I.
 Kerr, LORD Ralph D., CB., Col. late 10th
 Huss.
 Kettlewell, W. W., late Lieut. 27th Regt.
 Keyes, *Sir* C. P., KCB., Gen.
 Keyser, F. C., CB., Col. late R. Fus.
 Kilner, C. H., Lieut. R. A.
 Kilmarnock, C. G., LORD, Lieut.-Col. R. H.
 Gds.
 Kimber, H. D., late Lieut. 6th Middx. R.
 Vols.
 Kindersley, C. P. W., Lieut. Cold. Gds.
 King, H., Capt. late R. War. Regt.
 King, H. C., Capt. late 3rd Bn. Shrop. L. I.
 King, Walker S., Comr. R.N.
 King-Harman, M. J., Lt.-Col. Ben. S. C.
 Kingseote, *Sir* R. N. F., KCB., Col. 4th
 Bn. Gloue. R., late S. Gds.
 Kingsford, H. C., Lieut. R.N.
 Kingston, L. A., Lieut. West Rid. Regt.
 Kinloch, D. A., Capt. Gren. Gds.
 Kinloch, G. H. A., Lieut.-Col. Som. L. I.
 Kirby, *Sir* A., Lt.-Col., T. H. Eng. Vols.
 Kirkland, J. A. V., Maj.-Gen. late 5th Ft.
 Kirkpatrick, H. P., Lieut. 16th Laneers
 Kitehener, F. W., Capt. W. Yorks. Regt.
 Klein, Walter G., late Sub-Lieut. R.N.A.V.
 *Knight, H. S. G.S., Lt.-Col. late 19th Regt.
 Knight, W. H., Lieut. 12th Middx. R. Vols.,
 late 101st R. Ben. Fus.
 Knoeker, H. P., Major R.E.
 *Knollys, H., Lt.-Col. R.A.
 Knollys, W. W., FRGS., Col. late 93rd
 Highlanders
 Knowles, A. J., Lieut. 13th Middx. R. V.
 Knowles, C. B., CB., Col. late Hamps. Regt.
 Knowles, C. G. F., R.-Adm. (retd.)
 Knowles, James, Lieut. R.N.
 *Knox, R., Lt.-Gen., Col. 20th Huss.
 Knox, T. E., CB., Gen., Col. Hamp. Regt.
 Knox, W. G., CB., Major R.A.

LAKE, P. H. N., Capt. E. Lanc. Regt.
 L'Aker, J., Major late 1st Lond. Eng. Vols.
 Lamb, G. R., Lieut. R. A.
 Lambert, G., FSA., Major late Q.'s Westmr.
 R.V.
 Lambert, H. C., Capt. Q.'s Westmr. R.V.
 Lambert, J. A., Major 2nd Dr. Gds.
 Lambert, R., Capt. late 43rd L. I.
 Lambton, A., CB., Col. (h.p.) late Cold. Gds.
 Lambton, F. W., Maj.-Gen. late Scots. Gds.
 Lamont, James, Dep.-Lieut. of Bute
 L'Amy, J. R., Major late Forfar and Kin-
 cardine Art. Mil.

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Landon, F., Major 1st V. B. Essex R.
 Lane, F. W., Capt. late 67th Regt.
 Lane, R. B., Col. Rif. Brig.
 Lane-Fox, J. T. R., Capt. (ret.) Gren. Gds.
 Lane-Fox-Pitt-Rivers, A. H., Lt.-Gen.
 Lang, W. M., Capt. R.N.
 Langley, Gerald C., Capt. R.N.
 Lascelles, *Hon.* E.W. Maj. late W. York
 Mil.
 Lascelles, H. U., VISCOUNT, Lt.-Col. Yorks.
 Yeo., Capt. late Gr. Gds.
 Lascelles, W. R., Col., Assist. Adj. -Gen.
 Head Quarters Staff of the Army.
 Latter, B. H., Lieut. 2nd V. B. Q.'s O. Rl.
 W. Kent Regt.
 *Laughton, J. K., MA., late Naval Instruc-
 tor Greenwich Coll.
 *Laurie, J. W., Lt.-Gen. late 4th Regt.
 Law, F. T. A., CB., Maj.-Gen. late R.A.
 Lawrence, R. C. B., Major 1st Dr. Gds.
 Lawrence, W. A., Col. Ben. S. Corps
 Lawrence, W. W., Major R. Ir. Regt.
 Leach, E., CB., Col. (h.p.) late R. W. Kent
 Regt.
 Leach, E. P., *W.C.*, CB., Col. R.E.
 Le Blanc, T. E., Capt. late 37th Regt.
 Leconfield, LORD H. W., Capt. late 1st L.
 Gds.
 Le Coeq, H., Maj.-Gen. late R.A.
 Le Coeq, Wm. G., Comr. R.N.
 Lee, A. H., Lieut. R.A.
 Lee, E., Major York and Lane. Regt.
 Lee, H. L., Capt. Rl. Berks. Regt.
 *Lee, J. W., Col. 5th Bn. Rif. Brig.
 Leefe, J. B., Major R. M. A.
 Leeke, R., Lt.-Col. Gr. Gds.
 Leetham, A., Capt. 13th Huss.
 Lefroy, *Sir* J. H., KCMG., CB., FRs.
 Gen. R.A.
 Legard, J. D., Major late R.A.
 Le Geyt, W. B., late Asst. Com.-Gen. of Ord.
 Legge, *Hon.* E. H., Lt.-Col. late Cold. Gds.
 Legge, *Hon.* H. C., Major Cold. Gds.
 Legge, *Hon.* Heneage, Col. 9th Lancers.
 Legge, N., Capt. 20th Huss.
 Legge, W. K., Lieut. Essex Regt.
 Leggett, R. A., Capt. late 69th Regt.
 Le Grand, F. G., Maj.-Gen. R. M. L. I.
 Legh, G., Lieut. Gren. Gds.
 Legh, H. M. C., Col. late Gren. Gds.
 Le Grice, F. S., Col. R.A.
 *Leighton, *Sir* F., *Bart.*, Col. 20th Mid.
 R.V.
 Leith, J. M., Capt. 4th Bn. Norf. Regt.
 Le Mesurier, C. B., CB., Col. late R.A.
 Lemmon, E. B., Capt. 16th Middx. R.V.
 Leslie, G. F., Capt. Rif. Bde.
 Leslie, G., Lt.-Gen. late R.A.
 Leslie, J. H., Capt. late 71st High. L. I.
 Lester, C. M., Capt. W. Yorks. Regt.
 Le Strange, Charles, Comr. R.N.
 Lethbridge, *Sir* Wroth Acland, *Bart.*, late
 Lieut. R. Brig.
 Leveson, E. J., late Lieut. 5th Kent Art. V.
 Leveson, E. J., late Assist. Paymr. R.N.
 Leveson, J. J., Capt. R.E.
 Lewes, H. A., Col. late Ben. S.C.

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Lewin, H. F. C., Lt.-Col. late R.E.
 Lewin, W. H., Comr. (retd.) R.N.
 Lewis, C. A., Gen., Col. 1st Bn. N. Staff.
 Regt.
 Lewis, J. F., Major R.E.
 Liddell, R. S., Comg. 23rd Regtl. Dist., Col.
 late 10th Huss.
 Liddell, W. A., Lieut. R.E.
 Liddon, M., Capt. late 8th or King's Regt.
 Liebert, B. R., Lieut. 7th Huss.
 Ligertwood, T., MD., Surg. R. Hospital,
 Chelsea
 *Lindsay, Charles, Comr. R.N.
 Lindsay, *Hon.* C. H., CB., Lt.-Col. late
 Gren. Gds.
 Lindsay, C. L., Lieut. Gren. Gds.
 Lindsay, H. E. M., Capt. R.E.
 Listowell, EARL of, Capt. late S. Gds.
 Litchfield, E. F., Col. late Beng. N. I.
 Little, C. B., Capt. Som. L. I.
 Little, H. A., C.B., Col. Beng. S.C.
 Littledale, H. C. T., Maj. 2nd Dragoons.
 Livesay, R. A., Lt.-Col. R.E.
 Lloyd, A. H. O., Lieut. Gren. Gds.
 Lloyd, F., Capt. Gren. Guards
 Lloyd, F. T., CB., Col. late R.A.
 Lloyd, J. B., Major 5th V. B. Manch. Regt.
 Lloyd, M. B., Lieut. R.A.
 Lloyd, R. O., Major R.E.
 Lloyd, T. F., Maj.-Gen. late 98th Regt.
 Lloyd, T. H., Maj. R. A.
 Lluellyn, W. R., Col. late R.A.
 Loch, *Sir* H. B., GCMG., KCB., Col. 4th
 Bn. Ches. Regt.
 Loch, W., Lt.-Col. Bengal Local Forces.
 Lochner, C. P., Maj. late 39th Midx. R. V.
 Lockwood, A. R. M., Lt.-Col. late Cold. Gds.
 Locock, H., Col. R.E.
 Loder, F. C. J., Capt. Paym. 2nd Manc.
 Regt.
 Lodge, W. R., Capt. late Indian Army
 Loftus-Ottway, W. M., Col. late 1st Dr.
 Gds.
 Logan, *Sir* T. G., KCB., MD., late D.-G.
 A.M.D.
 Login, S. H. M., Comr. R.N.
 Long, C. J., Major R.A.
 Longden, *Sir* H. E., KCB., CSI., Gen., Col.
 Hamps. Regt.
 Longfield, F., Col. late L'pool Regt.
 Longley, A., Major, Staff Paymr. A. P. Dept.
 Longmore, *Sir* Thos., *Kt.*, CB., QHS.,
 Surg.-Gen.
 Loraine, F. E. B., Lt.-Col. late R.A.
 Lord, W. H., Lieut. Worc. Regt.
 Lovegrove, E., Major late Northamp. Regt.
 Lovell, P. A. D. A., Capt. Cold. Gds.
 Low, Alex., CB., Gen., Col. 4th Huss.
 Low, F., Capt. 22nd Midx. R.V.
 *Lowry, R. W., CB., Lt.-Gen.
 Lowther, F. W., Capt. (retd.) R.N.
 Lowther, J. W., Dep. Lieut. Cumberiand
 M.P.
 Luard, C. E., Maj.-Gen. late R.E.
 Luard, R. G. A., CB., Lt.-Gen., Col. 2nd
 Glouc. E. Vols.
 Luard, W. Du Cane, Lieut. R.E.

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Luard, W. G., CB., Adm. (retd.)
 Lugard, E. J., Col. R. Lanc. Regt.
 Lumsden, H. W., Lt.-Col. late R.A.
 Lurgan, LORD, Lieut. late Gren. Gds.
 Luttrell, Alex. F., Capt. Gren. Gds.
 Lynch, E. J., Col. 13th Q.'s Westmr. R.V.,
 late E. Kent Regt.
 Lynch-Staunton, G. S., Capt. late 14th
 Huss.
 Lyon-Fremantle, A. J., CB., Maj.-Gen. late
 Cold. Gds.
 Lyons, Sir Algernon McL., KCB., Adm.
 Lyons, *Sir* Daniel, GCB., Gen., Col.
 1st Bn. Derby Regt.
 Lyttelton - Annesley, A. L., Maj. - Gen.
 late 11th Huss.
 Lyttelton, LORD C. G., Col. late Worc. Yeo.
 Lyttelton, *Hon.* N. G., Col. Rif. Brig.

 McALLUM, W., Capt. 17th Midx. R.V.
 McCalmont, H., CB., Col. 4th Drag. G. Is.
 McCausland, M. F. H., Lt.-Col. R.A.
 McCleverty, Wm. A., Gen., Col. Northn.
 Regt.
 McClintock, *Sir* F. Leopold, *Kt.*, FRS.,
 Adm. (retd.)
 McClintock, W. G. W., Major York.
 Regt.
 McCoy, W. J., late Lt. South Devon Mil.
 McCracken, F. W. N., Major Rl. Berks. Regt.
 McCreagh-Thornhill, M., Maj. late 4th Dr.
 Gds.
 McDakin, S. G., Capt. late Black Watch.
 McDonald, J., Capt. Loth. Yeo.
 McDougall, W. B., Capt. 2nd Bn. Seaf.
 Highrs.
 McGrigor, *Sir* Chas., *Bart.*, Army Agent.
 McGrigor, C. R. R., Major K. R. Rif.
 Corps.
 *McGwire, E. T. St. L., Maj.-Gen. late 1st
 Foot.
 McHardy, A. A., Lieut. R.A.
 McKean, A. C., Lt.-Col. 6th Innis. Drs.
 McKirdy, John, Capt. R.N.R.
 McLeod, W. K., Lt.-Gen.
 McLeod, W. T., Assist. Com.-Gen.
 McMahon, A. H., Lieut. Gr. Gds.
 McMahon, A. R., Maj.-Gen. late M. S. C.
 McMahon, B. W. L., Lieut. Durham L.I.
 *McMahon, C. J., Maj.-Gen. late R.A.
 McMullin, J., Col. late Mad. S. Corps
 McMurdo, *Sir* W. M. S., KCB., Gen., Col.
 Ches. Regt.
 McNair, J. F. A., CMG., Major late R.A.
 McNalty, G. W., MD. Brig.-Surg. M. S.
 McQuhae, J. M., Comr. R.N.
 MacAdam, W., Lieut. R.E.
 MacCarthy, R. H., Major R. Lane. Regt.
 *Macdonald, A. M., Gen.
 Macdonald, Geo., Major R.E.
 Macdonald, *The Rt. Hon.* J. H. A., CB.,
 Col. Comg. Forth Vol. Bde.; Col.
 Comdt. Q.'s E. R. V. B.,
 Macdonald, W. C. R., CB., Gen. late Mad. S. C.
 MacDonnell, J.R., Maj. late 19th Midx.
 R.V.

1587 B

1587

MacDougall *Sir* Patrick L., KCMG., Gen.,
Col. W. I. Regt.
MacFarlan, D., CB., Lt.-Gen. late R.A.
MacFarlane, H. H., late Lieut. Scottish
Rifles.
Macfarlane, J., late Commissary
Macfie, W. Col. 3rd V. B. L'pool Regt.
Macgregor, C. A. Major late R.E.
*MacGregor, H. G., CB., Col. late Wore.
Regt., *ADC. to the Queen.*
Macgregor, P. L., Major R.A.
Mackay, H. F., Capt.
Mackean, K., Capt. R.E.
Mackenzie, G. F. C., Capt. The Suff. Regt.
Mackenzie, Hugh, Maj.-Gen. late 15th Ft.
Mackenzie, *Sir* J. D., *Bart.*, Major late 79th
Regt.
MacKinnon, G. H., CB., Gen., Col. 1st Bn.
Scottish Rifles
Mackinnon, W. A., CB., Director-Gen. M.S.
*Mackinnon, W. C., Col. late 3rd Buffs.
MacLagan, R., Gen. late R.E.
MacLagan, R. C., Col. 5th V. B. Rl. Scots.
*Maclean, *Sir* F. D., *Bart.*, Hon. Col. W.
Kent Yeo., late 13th Huss.
Maclean, P., Maj.-Gen. late R.A.
Maclean, A. D. late Lieut. R.A.
Maclean, T., Major late 101st Regt.
MacLeod, W. E., Maj.-Gen. late Bo. S.C.
Macneill, J. G. R. D., CB., Lt.-Col. Mad. S.C.
Macpherson, J. F., Capt. and Adj. Roxb.
and Selk. R. Vols.
Macpherson, J. L., Major R.E.
Macrae, H. R., Lt.-Col. The Q's. E. Rif. Vol.
Bde. (Loth. Regt.)
Macready, C. F. N., Lieut. 2nd Bn. Gord.
Highrs.
Madden, G. C., Major 1st Bn. W. I. Regt.
Magheramorne, Lord, KCB., Lt.-Col. late
1st Life Gds.
*Maillard, R. T., Col. late 16th Lancers
Main, Robt., Royal Naval College
Mainguy, F. B., Maj.-Gen. late R.E.
Mainwaring, H. B., Capt. Linc. Regt.
Maisey, F. C., Capt. Ben. S.C.
Maitland, C. L. B., CB., Gen., Col. 1st Bn.
Wilts. Regt.
Maitland, H. L. A. L., Rear-Adm. (ret'd.)
Maitland, H. R. S., Lieut. Yorks. Regt.
Maitland, J. M. H., CB., Col. (h.p.) late R.E.
Maitland, P. J., Lt.-Col. Bo. S. C.
Makant, W., late Lieut. 1st Bn. Wilts Regt.
Makgill - Crichton - Maitland, D., Col. Gr.
Gds.
Malet, *Sir* Henry C. E., *Bart.*, Lt.-Col. late
Gren. Gds.
Malet, H. E., Col. late 18th Huss.
Malgarini, F. L., late Lieut. Forfar and Kin-
cardine Art. Mil.
Mallock, T. J. R., Lt.-Col. late Royal Fus.
Maltby, J. M., Lt.-Col. 2nd Bn. W. I. Regt.
*Malthus, S., CB., Col. late 94th Regt.
Malton, W. D., Capt. late Scottish Bord. Mil.
Man, H., Gen. late Mad. S.C.
Manners, C. G. E. J., Lieut. Gren. Gds.
Manners, R. A., Col. late 2nd Bn. R. Scots.
Mansel, W. L., Major So. Lanc. Regt.

1640

1640

Mansell, A. B., Comr. (ret'd.) R.N.
Manson, A. R., Gen. Bo. I.
March, W. H., CB., Maj.-Gen. (ret'd.) R. M.
Markham, C. R., CB., FR.S., late R.N.
Marsh, J. T., Lt.-Col. R.E.
Marsh, W. D., Col. late R.E.
Marshall, F., CMG., Lt.-Gen.
Marshall, H. D., Capt. 5th Bn. Rif. Bde.
Marshall, H. S., Capt. Ches. Regt.
Marshall, J. W. A., Capt. A. P. D.
Marshall, T. E., Lieut. R.A.
Marshall, W. G. H., Lieut. Gr. Gds.
Marsham, H. S., Major late K. R. Rif. C.
*Marten, Francis, Rear-Adm. (ret'd.)
Martin, J. E. B., Lieut. K. R. R. Corps
Martin, R. H., Major 21st Huss.
Martin, *Sir* Wm. F., *Bart.*, GCB., Adm.
(ret'd.)
Marx, John L., Comr. R.N.
Mascall, F., Maj. R.E.
Massy, H. H., CB., MD., Surg.-Gen.
Masterman, John, Comr. R.N.
Matheson, D., Major late 6th Innis. Drs.
Matheson, J. H., Capt. 3rd Batt. E. Kent
Regt.
Matthews, F. B., Capt. R. Lanc. Regt.
Matthews, I., Vet. Surg. R. H. Gds.
Maude, *Sir* F. F., *B.C.*, GCB., Gen.
Maude, F. N., Capt. R.E.
Maude, F. S., Lieut. Cold. Gds.
Maude, *Sir* G. A., KCB., Col. late R.H.A.
Maude, R. J., Capt. Rif. Brig.
Maunsell, F. G., Lieut. R.A.
Maunsell, J. D., Capt. Durh. L.I. Paym.
A.P.D.
Maurice, J. F., Col. R.A.
Maw, James, Capt. late 3rd Essex Art. Vols.
Mawer, F. G. Capt. Welsh Regt.
Mawson, W. W., Lt.-Col. late 33rd Lanc.
R.V.
Maxse, Fred. A., Adm. (ret'd.)
Maxse, F. I., Lieut. R. Fus.
Maxwell, R. J., Col. late 96th Regt.
Maxwell, W. H., Rear-Adm.
May, John, Capt. late Hants Militia
May, W. H., Capt. R.N.
Maybery, H. O. A., Capt. 1st V. B. S. W.
Bord.
Mayes, W., Capt. (ret'd.) R.N.
Mayhew, C. G. A., Lt.-Col. N. Midld. Vol.
Bde.
Mayne, C. B., Major R.E.
Mayo, J. H. late Lieut. W. Norfolk Mil.
Mead, H. R., Lieut. Bom. S. C.
Mead, H. R., Col. R.E.
Meade, J. M. de C., Gen. R. M. L. I.
Meade, *Sir* R. J., KCSI., CIE., Lt.-Gen.
Ben. S.C.
Medley, E. J., Capt. Ben. S. C.
Melgund, G. J., Viscount, Col. Comg.
South of Scotland Vol. Bde.
Menzies, N. J., Capt. Scots Gds.
Mercer, W. H. W., Lieut. Mad. S.C.
Meredith, E. S., Capt. R.E.
Mesham, A., Col. Denb. Yeo. Cav., Capt.
late 1st R. Drs.
Messervy, G. T., Major 12th Middx. R.V.

1698

1398

Methuen, F. H. P., Lord, Col. 3rd Bn. Wilts. Regt., *ADC. to the Queen*
 Methuen, Hon. Paul S., CB., CMG., Col. 2nd V.B. Wilts. Regt., late Sco. Gds.
 Mewburn, J., Col. 6th Lanc. Art. V.
 Meyrick, Aug. W. H., Lt.-Gen.
 Meyrick, J. J., C.B., Inspt. Vet. Surg. (ret'd.)
 Micklem, E., Maj.-Gen. late R.E.
 Middleton, Sir F. D., KCMG., CB., Lieut.-Gen.
 Middleton, O. R., Col. Comdg. 4th Regtl. Dist. late R. Lanc. Regt.
 Middleton, R. W. E., Lieut. (ret'd.) R.N.
 Middleton, W. C., Capt. 2nd Drs.
 Mildmay, H. P. St. J., Major Gren. Gds
 *Mildmay, Sir Henry B. P. St. John, *Bart.*, Col. late Hants Yeo.
 Miller, A., Capt. late 3rd Bn. Hamp. Regt.
 Miller, A. W., Staff Comr. R.N.
 Miller, D. S., Lt.-Col.
 Miller, F. H., Supt. H.M. Rl. Vietg. Yard, Deptford
 Miller, G. M., CB., Maj.-Gen. late 79th Highrs.
 Miller, H. M., Rear-Adm. (ret'd.)
 Milligan, C., Lt.-Col. late 39th Regt.
 Millington, W., Capt. late 3rd Essex Art. Vols.
 Mills, C. J. C., Gen.
 *Milman, G. A., Col. late R.A.
 Milne, G. F., Lieut. R.A.
 Milne, Sir Alex., *Bart.*, GCB., Adm. of the Fleet
 Minchin, F. F., Capt. R.A.
 Mitchell, Sir C. B. H., KCMG., Lt.-Col. (ret'd.) R. M. L. I.
 Mitchell, H. H., Capt. late Rifle Brig.
 Mitchell, H. L., Col. R.A.
 Mitford, B. R., Lieut. E. Kent Regt.
 Mitford, J., Lieut. Civil Service R.V.
 Moffat, H. B., Major S. Wales Bord.
 Molyneux, Sir Robert H. M., KCB., Rear-Adm.
 Molyneux, W. C. F., Maj.-Gen. late Ches. Regt.
 Monckton, E. P., Lt.-Col. 3rd Bn. Northn. Regt.
 Monckton, P. E., Major R.A.
 Moncrieff, A., CB., FRS., Col. late 3rd Brig. Scot. Div. R.A.
 *Moncrieff, G. H., Maj.-Gen. late S. Gds.
 Money, E. C., Major 1st Bn. R. Ir. Fus.
 Monson, Hon. D. J., Capt. late 96th Regt.
 Montagu - Stuart - Wortley, E. J., CMG., Major K.'s R. Rif. Corps.
 Montgomery, K. R., Maj. 2nd V.B. Middx. Regt.
 Montgomery, W. E., Col. S. Gds.
 *Montizambert, C.E., Lt.-Col. Canadian Art.
 Montresor, H. E., Lt.-Col. late Gr. Gds.
 Moody, J. L., MA., late Chap. to the Forces
 *Moody, J. McD., Col. R. M. L. I.
 Moore, Arthur W., Capt. R.N.
 Moore, A. G. H. W., Lieut. R.N.
 *Moore, A. G. M., Col. late 4th Huss.
 Moore, C. H. H., Lieut. R.N.
 Moore, T. B., Lieut. R.E.

1749

Moorsom, H. M., Col. R.A.
 Morant, George D., Rear-Adm. R.N.
 More-Molyneux, G. H., Capt. Ben. S. C.
 Morgan, F. C., Major R.A.
 *Morgan, H., Lt.-Col., late Staff Paym. A. P. D.
 Morgan, H. H., Capt. (ret'd.) R. M. L. I.
 *Morgan, J. P., Maj.-Gen. late R.A.
 Morrieson, H. W., Capt. R.A.
 Morris, A., Capt. late 20th Huss.
 Morris, A. W., Major Northn. Regt.
 Morris, W. G., Major R.E.
 Morrison, G. H., Lt.-Col. Forf. and Kincar. Arty. (S. Div. R.A.)
 Morse, H. B., late Com.-Gen.
 Morshead, A. A., Lt.-Col. late S. Wales Bord.
 Mortimer F. W., Capt. 6th Middx. R. Vols.
 Mortimer, H. B., Major North Staff. Regt.
 *Morton, G. de C., Col. R. Mun. Fus.
 Morton, W. R., Lieut. R.E.
 Mounteney-Jephson, R., Lieut. late 9th Regt.
 Mountstevens, F. H., Maj. 3rd Bn. Devon Regt., Capt. (ret'd.) R. M. I. I.
 Moysey, C. J., CMG., Col. late R.E.
 Muncaster, Lord, Col. 1st V.B. Bord. Regt., late R. Brig., MP.
 Munro, C., Capt. late Gren. Gds.
 Munro, C. A., Col. Ben. Staff Corps
 Munro, L., Capt. Hamps. Regt.
 Murchison, K. R., Capt. late Som. Yeo.
 Murdoch, J., Lt.-Col. late Q. R. V. Bde. Rl. Scots.
 Murphy, A. R., Lieut. late 1st W. I. Regt.
 Murphy, M., Lt.-Col. N. S. W. Art.
 Murray, A. J., Capt. Rl. Innis. Fus.
 Murray, A. M., Major R.A.
 Murray, A. P., Lieut. Gord. Highrs.
 Murray, D. C., Major R. War. Regt.
 Murray, J., Lt.-Col. late Gr. Gds.
 Murray, R. H., Lt.-Col. Seaf. High.
 Murray, K. D., D.S.O., Col. late R. Ir. Fus.
 Murray, Hon. W. D., Lieut. Gr. Gds.
 Mussenden, W., Col., late 8th Huss.
 Myers, A. B. R., Brig.-Surg. M. S.
 Myers, W. J., Capt. K. R. Rif. C.

NANGLE, W. C., Com.-Gen. of Ord. (ret'd.)
 *Napier, Gerard J., Vice-Adm. (ret'd.)
 Napier, Hon. J. S., Major Gord. Highrs.
 Nares, Sir Geo. S., KCB., FRS., Rear-Adm. (ret'd.)
 Nash, E., Major Essex Regt.
 *Nason, J., Lieut.-Gen.
 Neale, S. W., Lt.-Col. 15th Middx. R. Vols.
 Needham, C., Col. 1st Life Gds.
 Needham, J. L., Lt.-Col. late R.M. Art.
 Nelson, W. F., Major late R.A.
 Nelson-Ward, Philip, Lieut., R. N.
 Nesham, T. P. W., Capt. R.N.
 Nettleship, W. F., Col. 3rd V.B. E. Surrey Regt.
 Neville, E., Lt.-Col. late S. Gds.

1749

1803 B 2

1803

Newall, D. J. F., Maj.-Gen. late R.A.
 Newcome, H. G., Major late R.A.
 Newdigate-Newdegate, Edw., CB., Lt.-Gen.
 Newdigate, H. R. L., CB. Maj.-Gen. late Rif. Bde.
 Newington, C. G. H., Capt. late E. Surr. Regt.
 Newington, C. M. H., Major L'pool Regt.
 Nicholls, T., Lt.-Col. 32nd Punjab Pioneers
 Nicholson, G. H., Lieut. Hamps. Regt.
 Nicholson, H. A., Maj. late S. Lanc. Regt.
 Nicholson, J. S., Lieut. 7th Hus.
 Nicholson, Sir L., KCB., Gen. late R.E.
 Nicholson, S. J., Col. (h.p.) R.A.
 Nicholson, W. G., Lt.-Col. R.E.
 Nicolson, Sir Fred. W. E., *Bart.*, CB., Adm. (retd.)
 Nisbett, G. D. M., Capt. Bedf. Regt.
 Noble, A., CB., Capt. late R.A.
 Nolan, J. P., Col. late R.A., MP.
 Norbury, T. C. N., CB., Col. 3rd Bn. Worc. Regt.
 *Norcock, Charles J., Capt. R.N.
 Norie, E. W. M., Lieut. Middx. Regt.
 Norman, Sir F. B., KCB., Maj.-Gen. Ben. S. C.
 Norman, Sir H. W., GCB., GCMG., CIE., Gen. late Ben. S. C.
 Norman, W. W., Lieut. Ben. S. C.
 Northcott, H. P., Capt. Leins. Regt.
 North, J. S., Col. late Q. O. L. I. Mil.
 North, LORD, late Lieut. 1st L. Gds.
 *Northumberland, The DUKE of, KG., Col. 2nd Northd. Arty. Vol. and 3rd Bn. Northd. Fus.
 Noyes, A. W., Major W. Yorks. Regt.
 Nugent, A., Lieut.-Gen. late 2nd Drs.
 Nugent, Sir C. B. P. N. H., KCB., Col. late R.E.
 Nugent, C. E., late Lieut. 43rd L. I.
 Nugent, C. H. H., Lieut. R.E.
 Nugent, G. C., Lieut. Gren. Gds.
 Nugent, Sir G. E., *Bart.*, Lt.-Col. late Gr. Gds.
 Nugent, R. A., CB., Lt.-Col. Army Service Corps.
 Nuthall, W. F., Gen. late Ben. I.

O'BRIEN, E. D. C., Col. R.E.
 O'Brien, E. D. J., Capt. 3rd Drag. Gds.
 O'Brien, Sir J. T. N., KCMG., Lt.-Col., Gov. and Com.-in-Chief Newfoundland.
 O'Byrne, Robert, FRGS., Navy Agent
 O'Callaghan, D. D. T., Lt.-Col. R.A.
 O'Callaghan, E., Capt. late 16th Regt.
 O'Connor, J., Lt.-Col. late Army P. Dept.
 Ogg, G. S. W., MD., Surg.-Gen.
 Ogilvy, W. L. K., CB. Col. late K.R.R.C.
 Oldfield, J. R. H., Capt. R. M. L. I.
 Oldfield, H. J., Lieut. R.N.
 *Oldfield, R., Maj.-Gen. late R.A.
 Oldham, H. H., Col. late Camn. Highrs.
 Oldknow, Reginald C., Fleet Eng. (retd.) R.N.

1853

1853

Oliver, J. R., CMG., Maj.-Gen. late R.A.
 Oliver, L. G., Capt. Middx. Regt.
 Oliver, S. P., Capt. late R.A.
 Olpherts, Sir W., *W.C.*, KCB., Gen. R.A.
 O'Malley, F. W., Col. 3rd Bn. S. Lanc. Regt.
 O'Meara, W. A. J., Lieut. R.E.
 Ommanney, A. E., Major E. Kent Regt.
 Onslow, A. E., Lt.-Col. late S. Gds.
 Onslow, Geo. M., Col. late 20th Huss.
 Ormathwaite, LORD, Col. 3rd Bn. So. Wales Bord.
 Ormiston, J. W., Lieut. R.A.
 Ormsby, G. F., Capt. late 2nd Dr. Gds.
 Orr, S. E., Col., late 2nd Bn. Conn. Rang.
 Osborn, G., Capt. R.A.
 Ostell, J., Capt. 1st V.B. Bord. Regt.
 *Ostrehan, E. S., Col. Bomb. S. C.
 O'Sullivan, E. O. Major R.A.
 Oswald, J., Capt. 16th Lancers
 Oswell, B. T., Capt. 2nd V. B. N. Staff. Regt.
 Ouchterlony, T. H., Lt.-Col. late R.A.
 *Owen, C. H., Maj.-Gen. late R.A.
 Owen, F. H. E., Lt.-Col. R.M.A.

PACKMAN, F. W. V., Lt.-Col. late A. P. D.
 Page, G. H., Lt.-Gen.
 *Page, S. F., Major late Lon. Sc. R.V.
 Paget, A. de B. V., Capt. Durh. L. I.
 Paget, A. W., Comr. R.N.
 Pain, G. W. H., Capt. Rl. W. Surr. Regt.
 Pakenham, Hon. F. B., Maj.
 Pakenham, T. H., Lt.-Gen.
 Palliser, E. M., Capt. late 7th Huss.
 Palmer, F. C., Capt. 7th Dr. Gds.
 Palmer, F., Col. late Scots Gds.
 Palmer, G. H., Major R.A.
 Palmer, Sir R. W. H., *Bart.*, Lt.-Gen. late 2nd L. Gds.
 Pamphlett, W. F., Engineer R.N.
 Papillon, Fredk., Comr. R.N.
 Parish, H. W., CB., Maj.-Gen.
 Parish, R. W., Fleet Paym. R.N.
 Parke, R. K., Major 3rd Drag. Gds.
 Parke, Sir Wm., KCB., Gen., Col. 2nd Bn. Worc. Regt.
 Parker, C. W., Major late 69th Regt.
 Parker, F. G. S., Major late 54th Regt.
 Parker, Philip R. H., Capt. (retd.) R.N.
 Parker, R. J. H., Lt.-Col. R.E.
 Parker, E. D., Lieut. Manch. Regt.
 Parkyn, G. J., Lt.-Col., A.S. Corps.
 Parnell, Hon. H., CB., Col. Comdg. 18th Regtl. Dist.
 Parrott, T. S., Major N. S. Wales Eng.
 Parry, E. C. M., Lieut. E. K. Regt.
 Parsons, C., Maj.-Gen. late 3rd Buffs
 *Parsons, L. W., Major R.A.
 Paston-Cooper Edmund, C. A., Lieut. R.N.
 Patchett, W. G., Lt.-Col. 2nd Bn. W. I. Regt.
 *Payn, Sir W., KCB., Gen.
 Peacocke, W., CMG., Major R.E.
 *Pead, L. W., M.A., Hon. Major Lan. Arty (S. Div. R.A.)
 Pearce, Fras. G., Fleet Paym. (retd.) R.N.
 Pearce, H. W., Capt. E. Sur. Regt.

1912

*Pearson, *Sir* C. K., KCMG., CB., Maj.-Gen. late 3rd Buffs.
 Pearson, F. C., Capt. 4th Huss.
 Pearson, R. L. O., Col. late Gr. Gds.
 Peckham, T. H., Major, Paym. 3rd Huss.
 Peel, J. F., Capt. late S. Gds.
 Peirse - Duncombe, G. T., Capt. late 16th Regt.
 Pelly, *Sir* Lewis, KCB., KCSI., Lt.-Gen. Bo. S.C.
 Pemberton, R. C. B., Col. R.E.
 Pemberton, W. L., CB., Col. (h.p.) late 60th Rifles
 Pennefather, R. P., Lt.-Col. late R.E.
 *Pennethorne, L. P., Capt. late R.A.
 Pennington, Edward, J.P. for Surrey, late War Office
 Penno, F. S. L., Major Welsh Regt.
 Penrose, C., Capt. R.E.
 Penton, A. P., Major R.A.
 Perceval, C. C., Lieut. R.E.
 Pereira, G. E., Lieut. Gren. Gds.
 Perkins, *Æ*, CB., Maj.-Gen. late R.E.
 Perry, C. S., Col. late Norf. Regt.
 Perry, L. F., Col. R.A.
 Peters, C. W., Major 4th Huss.
 Petrie, R. D., Lieut. R.E.
 *Peyton, F., CB., Gen.
 Pfoundes, C. J. W., Esq., FRGS., &c.
 Philipps, *Sir* C. E. G., *Bart.*, Lord Lieut. of Haverfordwest, Major Pembroke Yeo. Cav.
 Philips, Alex., Rear-Adml. (ret'd.)
 Philips, G., Col. R.E.
 *Philips, G., Col. late 4th Huss.
 Phillimore, W. G., Lieut.-Col. R.A.
 Philipps-Treby, P. W., Maj.-Gen. late R.A.
 Phillips, G. E., Lieut. R.E.
 Phillips, T., Col. late 18th Huss.
 Phillips, W. C., Maj.-Gen. late Mad. S.C.
 Philippotts, A. T., Gen. R.A.
 Philippotts, W. C., Col. late R.E.
 Phipps, R. W., Col. late R.A.
 Piers, C. B., Major and Paymaster R.A.
 Pierson, J. E., Capt. R. Suss. Regt.
 Pigott, J. C. M., Major late Rl. Berks. Regt.
 Pilleau, H. G., Lt.-Col. R.E.
 Pilkington, H. L., Capt. 21st Huss.
 Pinhey, A., Capt. late R.A.
 Pinney, C. F., Lieut. Rif. Bde.
 Pinnock, A. H., Capt. Kingston Vol. Mil.
 Pitcher, D. G., Lt.-Col. Ben. S. C.
 Pitman, W., Capt. (ret'd.) R. M. A.
 Pitt, W., Major R.E.
 Playfair, W. M., Lt.-Col., Staff Paym. A. P. D.
 Plomer, W. H. P., Capt. R. I. Fus.
 Plowden, F. H., Major Oxf. L. I.
 Plunkett, R. H. W., Major R.A.
 Pocklington, E. B., Major 2nd Bn. Oxf. L. I.
 Pocklington, F., Col. late Northd. Fus.
 *Pocklington, G. H., Lt.-Col. late 18th R. I. Regt.
 Poë, E. S., Capt. R.N.
 Poett, J. H., Capt. Dorset Regt.
 *Pole, C. V. N., Maj.-Gen. late Cape M. R.
 Pollard, C., Lt.-Gen. R.E.
 Pollock, E., Capt. R.A.

1971

1971

Pollock-Gore, W. A. M., Lieut. Loth. Regt.
 Ponsonby, *Hon.* A. J. G., Capt. late Gr. Gds.
 Ponsonby, F. E. G., Lieut. Gren. Gds.
 Ponsonby, J., Lieut. Colds. Gds.
 *Pooley, H., Capt. late 3rd Chcs. Art. V.
 Pope, W. A., late Lieut. 1st Beng. Fus.
 Porteous, D. S., late Lieut. 2nd Drs.
 Porter, G. M., Capt. R.E.
 *Portman, Viscount W. H. B., Col. late West Som. Yeo.
 Pott, N., Col. 2nd V. B. East Sur. Regt.
 Pottinger, B. H., Major-Gen. R.A.
 Poulton, A. F., Capt. Suff. Regt.
 Powell, E. W. M., Lieut. R.A.
 Powell, R. A., CB., Vice-Adm. (ret'd.)
 Powell, S. H., Lieut. R.E.
 Powell, T. H., Capt. late S. Gds.
 Power, *Sir* W. T. J., KCB., late Com.-Gen.-in-Chief
 Powys, *Hon.* C. J. F., Col. late 2nd Bn. Welsh Regt.
 Powys-Keck, H. L., late Lt. Leicester Yeo.
 Pratt, H. M., CB., Col. Beng. S.C.
 Prattent, F. M., Rear-Adm.
 Prescott, A. S. K., Dep.-Surg.-Gen. M. S.
 Preston, A. T., Major R.E.
 Preston, B. H., Col. M. S. C.
 Pretymann, C. H. S., Comr. R.N.
 Pretymann, G. T., Brig.-General R.A.
 Pretymann, H. E., Lieut. Gren. Gds.
 Price, Arthur, Paym.-in-Chief (ret'd.) R.N.
 Price, E. A. U., Capt. 3rd Bn. Oxf. L. I.
 Price, G. E., Comr. (ret'd.) R.N., MP.
 Prichard, H. C., Capt. Northn. Regt.
 *Prickett, T., Major 2nd Bn. Essex Regt.
 Prince, W. C. S., Lieut. Middx. Regt.
 Pringle, *Sir* N. W. D., *Bart.*, Col. late S. Staff. Regt.
 Pritchard, G. D., CB., Maj.-Gen. late R.E.
 Probyn, *Sir* D. M., *W.C.*, KCB., KCSI., Gen. late Ben. Cav.
 Prothero, A. W. E., Comr. R.N.
 Protheroe, M., CB., CSI., Col. M.S. Corps.
 Prower, N., Lieut. late 22nd Middx. R. V.
 Prowse, J. F., Capt. (ret'd.) R.N.
 Pulteney, W. P., Lieut. Scots Gds.
 Purchas, W. R., Major R.E.
 Purdon, H. G., Capt. 1st Bn. N. Staff. Regt.
 Purkiss, W. T., Capt. 1st City of Lon. Art. Vols.
 Purvis, J. C., Rear-Adm. (ret'd.)
 Purvis, J. S., Lieut. R.E.
 Pusey, E. B., Capt. (ret'd.) R.N.
 Pym, F., late Lieut. 1st Life Gds.
 Pym, S., Lieut.-Col. late R.A.
 Pyne, J. C., Capt. Dorset Regt.

QUICK, George, Fleet Engineer R.N. (ret'd.)
 Quill, A. S., Col. ret. pay
 Quill, J. J., Major R. M. L. I.
 Quinn, J. R. W., Staff-Comr. R.N.

RADCLIFFE, R. P., Lt.-Gen. R.A.
 Raikes, E., Lt.-Col. late 105th Ft.

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Rainey, H., Capt. late 1st C. of Lon. Art. Vols.
 Rainsford-Hannay, R. W., Major R.A.
 Raitt, E. R., late War Office
 Ramsbotham, J., Major late 3rd Bn. R. Sus. Regt.
 Randolph, C. W., Lt.-Gen.
 Rawes, W. W., Lt.-Col. late R.A.
 Ray, A. E., Col. late 3rd Middx. Art. V.
 Rayden, W., Lieut. The Buffs
 Read, A. C., Paym.-General's Office.
 Read, J. M., Lt.-Col. 4th Ches. Regt. late Capt. 13th L. Inf.
 Reade, R. N. R., Capt. Shrop. L.I.
 *Ready, J. T., Col. late Rl. Berks Regt.
 Redway, G. W., Lieut. 3rd Bn. Welsh Regt.
 Reeve, E. P. F., Lt.-Col. late Cold. Gds.
 Reeves, H. S. E., CB., Col. A. S. Corps.
 Reeves, J., Major R. I. Fus.
 Reid, D., Lt.-Col. late 1st Ft.
 Reid, P. S. G., Capt. late R.E.
 Rennie, J., CB., Capt. late I. N.
 Renny, H., CSI., Gen., Col. 2nd Bn. L. N. L. Regt.
 Renny-Tailour, H. W., Major R.E.
 Reynardson, C. B., Col. late Gr. Gds.
 Reynolds, P. W., Lieut. 22nd Middx. R. Vol.
 Ricardo, A. D., Lieut. R.N.
 Ricardo, F. C., Capt. Gren. Gds.
 Ricardo, H., Col. Gr. Gds.
 Richards, Sir F. W., KCB., Vice-Adm.
 Richards, S. S. C., Col. 19th Middx. R.V.
 Richards, W. H., Col. late 2nd Bn. Bord. Regt.
 Richardson, J. M., Major Northd. Arty. (W. Div. R.A.)
 Richardson, J. S., CB., Maj.-Gen. N. S. W. Local Forces
 Richmond, H. T., Maj.-Gen.
 Rickards, A. W. L., Capt. Loth. Regt.
 Ricketts, H. C., Lieut. Rl. I. Fus.
 Riddell, W. H., Capt. Bedf. Regt.
 Ridgeway, Sir Joseph W., KCSI., CB., Col. Beng. Army
 Ridgeway, R. K., G.C., Major Ben. S. C.
 Ridgway, J. C., Capt. 1st V. B. S. Lan. Regt.
 Ridout, D. H., Lieut. R.E.
 Ripley, T. E. T., late Ord. Dep.
 Ripon, MARQUIS of, KG., Col. 1st V. B. W. Yorks. Regt.
 Rising, C. C., Capt. (retd.) R.N.
 Robb, F. S., Capt. 2nd Dur. L. I.
 Roberts, A. E. S., Lieut. late 82nd Ft.
 Roberts, A. N., Capt. A. S. Corps.
 Roberts, A. S., Capt. 1st Bn. W. I. Regt.
 Roberts H. B., Col. (retd.) R. M. A.
 Roberts, H., Col. 16th Middx. R. V.
 Roberts, G. R., Maj.-Gen. late Ben. S. C.
 Robertson, M., Capt. late W. Kent Mil.
 Robertson, R. S., Maj.-Gen. late Beng. S. C.
 Robertson, W., Col. late Mad. S. C.
 Robertson, G. A., Lieut. Ben. S. C.
 Robinson, C. N., Com. (retd.) R.N.
 *Robinson, C. W., CB., Col. late Rif. Brig.
 Robinson, F. C. B., Rear-Adm.
 Robinson, F. W., Major Shrops. L. I.

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*Robinson, G. C., Maj. late 17th Lanc.
 Robinson, H. A., Capt. late 16th Lanc.
 Robinson, H., Lt.-Col. R.E.
 Robinson, H., CB., Dep. Controller
 Robinson, H. J., Lt.-Col. 6th Lan. Art. Vols.
 Robinson, W. M., Col. 1st V. B. R. W. Surrey Regt.
 Rocca, H. L., Col. 15th V. B. Manchester Regt.
 Rodd, John R., Adm. (retd.)
 Roden, EARL of, Col. late Scots Gds.
 Rodwell, E. H., Capt. Ben. S. C.
 *Rogers, E., FRGS., Lt.-Col., S. O. P.
 *Rogers, J. E. V., Lt.-Col. late 102nd R. M. Fus.
 Rogers, R. W. S., Comr. R.N.
 Rolfe, Ernest N., C.B., Capt. R.N.
 Rolfe, R., Major 21st Middx. R.V.
 Rolleston, J. P., Lieut. R.N.
 Rollo, Hon. R., CB., Gen., Col. Rl. Highlrs.
 Rolph, W. M., Major Leic. Regt.
 Romilly, F. W., D. S. O., Major Scots Gds.
 Romney, EARL of, late Lieut. E. Kent Yeo.
 Rooke, H. D., Col. late Shrops. L. I.
 Rooper, H. B., Lieut. R.N.
 Roper, A. W., Lieut. R.E.
 Rose, H., Capt. R.N.
 Rose, W. M., late Ens. 32nd Regt.
 Ross, Sir John, KCB., Lieut.-Gen.
 Ross, W. G., M.D., Brig.-Surg. M. S.
 Ross, W. H., Col. Bombay S. C.
 Ross of Bladensburg, E. J. T., Major R.E.
 Ross of Bladensburg, J. F. G., Capt. Cold. Gds. **Gold Medalist, Military Essay, 1877**
 Rothe, G. W. C., Lt.-Col. R.A.
 Rough, W. E. M., Major 7th Dr. Gds.
 *Roupell, C. M., Capt. late Inns of Court R.V.
 Routledge, R. W., Col. 2nd V. B. City of Lond. Regt.
 Ruck, R. M., Major R.E.
 Ruggles-Brise, H. G., Lieut. Gren. Gds.
 Russell, C. H., Col. Inns of Court R.V.
 Russell, C. J., Lt.-Col. R.E.
 *Russell, J. C., Col. Comdt. Cav. Dépôt late 12th R. Lancers.
 Russell, J. C., Capt. 2nd V.B. W. York. Regt.
 *Rutley, J. L., Lt.-Col. 2nd Mid. Art. V.
 Ryan, C. J., Col. Manch. Regt.
 Rycroft, Sir N., Bart., Col. 3rd Bn. Hamps. Regt.
 Ryde, F. E., Lieut. 2nd Bn. W. I. Regt.
 Ryder, C. H. D., Lieut. R.E.
 Ryder, W. L., Lieut. Beng. S. C.
 Ryley, F., Major 2nd Bn. L. N. Lan. Regt.

ST. AUBYN, Hon. J. T., Lieut. Gren. Gds.
 St. Clair, J. L. C., Major Arg. and Suthld. Highrs.
 St. George, A. W., Capt. W. Yorks. Regt.
 St. George, Sir J., GCB., Gen. R.A.
 St. John, E. B., Lt.-Col. late R. Suss. Regt.
 St. John-Mildmay, CB., Capt. R.A.

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Salis-Schwabe, G., Col. (h.p.) late 16th Lancers
 Salmon, *Sir* Nowell, *U.C.*, KCB., Vice-Adm.
 Salmoud, W., Col. late R.E.
 Salomons, J. P., Major late 2nd T. H. Eng. Vols.
 Salusbury, F. O., CB., Maj.-Gen.
 Sandbach, W., Lient. Rl. Lanc. R.
 Sandes, H. T. T., Lt.-Col. late R.A.
 Sandford, F. M. H., Lieut. Gren. Gds.
 Sandhurst, W., Lord, late Lieut. Cold. Gds.
 Sandilands, P. H., Maj.-Gen. late R.A.
 *Sandwich, EARL of, Col. 5th Bn. K. R. Rifle Corps, late Gr. Gds.
 Sandys, T. M., MP., Lt.-Col. 4th Bn. L. N. Lan. Regt.
 Sapte, H. L., Capt. Rl. Sussex Regt.
 Sargent, J. N., CB., Lt.-Gen.
 Sartorius, E. H., *U.C.*, Col. late E. Lan. Regt.
 Sartorius, G. C., CB., Col. Bom. S. C.
 Satterthwaite, B. A., Major 2nd Bn. L. N. Lan. Regt.
 Saunders, A. A., Major R.A.
 Saunders, A. J., Major late R.A.
 Saunders, W. B., Maj.-Gen. late R.A.
 Savile, A. R., Lt.-Col. late R. Ir. Regt.
 Savile, C. C., Capt. 1st Glouc. A. Vols.
 Savile, H., Lieut. R.N.
 Sawyer, C., Lt.-Gen., Col. 7th Drag. Gds.
 Saxe-Weimar, *H. S. H.* PRINCE Wm. Augustus Edward of, GCB., Gen., Col. 1st Life Guards.
 Sayer, J. R. S., CB., Lieut.-Gen., Col. 1st Dr. Gds.
 Scafe, C. H., Major R. M. L. I.
 Schaw, H., CB., Maj.-Gen. late R.E.
 Schomberg, G. A., CB., Gen. (ret'd.) R.M.A.
 Schreiber, A. L., Lieut. R.E.
 Scobie, M. J., Major 3rd Bn. Loth. Regt.
 Sconce, G. C., late Lieut. I. N.
 Scot, P. G., Lt.-Gen. late Beng. Inf.
 Scott, A. de C., Maj.-Gen. late R.E.
 Scott, A. G., Lieut. R.A.
 Scott, *Right Hon.* Lord Charles T. M. D., CB., Rear-Adm.
 Scott, E. W. S., Maj.-Gen. late R.A.
 Scott, *Sir* Francis D. S., *Bart.*, Lieut. R.N.
 Scott, L. K., Lt.-Col. late R.E.
 Scott, R. A. E., Rear-Admiral (ret'd.)
 Scott, T. A., Col. Beng. S.C.
 Scott, W., Capt. late 1st R. Drs.
 Scott, W. A., Capt. Gord. Highrs.
 Scott, W. C. E., Capt. late 100th Regt.
 Scott-Kerr, Robt., Lieut. Gren. Gds.
 Scriven, A. G., Capt. 2nd Bn. Oxf. L. I.
 Scrivener, T. P., Col. late Q.'s Westminster Vols.
 Seaman, W. C., MD., D. I.-G. of Hosps.
 Sebright, E. R. S., Capt. 4th Bn. Bedf. Regt.
 Seddon, H. C., Col. late R.E.
 Sefton, W. P., EARL of, Capt. late Gr. Gds.
 *Selby-Smyth, E. G., Major 2nd Bn. R. Ir. Rif.
 Selby-Smyth, *Sir* E., KCMG., Gen., Col. 1st Bn. Sea. Highrs.

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Selwyn, C. W., MP., Capt. Royal Horse Gds.
 Selwyn, Jasper H., Adm. (ret'd.)
 Semini, V., Capt. Leic. Regt.
 Sempill, Lord, Col. 4th V. B. Gord. Highrs.
 Sergeant, C. W., Lieut. Sco. Gds.
 Seth-Smith, C. E., Lieut. R. N. A. V.
 Seton, A. D., Capt. Forfar. and Kincard. Arty. (S. Div. R.A.)
 Seton, *Sir* W. S., *Bt.*, Col. Bom Staff Corps.
 Settle, H. H., Lt.-Col. R.E.
 Sewell, J. H., Capt. 1st Bn. Norfolk Regt.
 *Sewell, T. D., Lt.-Col. late 4th Bn. R. Fus.
 Seymour, Lord A. C., Col. late Sc. Gds.
 Seymour, E. H., CB., Rear-Adm.
 Seymour, F. H. A., Maj.-Gen. late Rif. Brig.
 Seymour, L. R., Lt.-Col. late Gr. Gds.
 Seymour, Lord W. F. E., Maj.-Gen. late Cold. Gds.
 Shakerley, *Sir* Charles W., *Bart.*, CB., Col. 5th V. B. Cheshire Regt.
 Sharman-Crawford, R. G., Capt. 16th Lanc.
 Sharpe, J. B., Capt. R.E.
 Shaw, F. C., Capt. Derbys. Regt.
 Shaw-Hellier, T. B., Col. late 4th Dr. Gds.
 Shelley, C., Col. late S. Gds.
 Shenstone, F. S., Major late Worc. Yeo.
 Shepherd, J. L. F., Lieut. R.A.
 Shervinton, C. R., Lt.-Col. late Dep.-Com.-Gen.
 Shervinton, C. R. St. L., Col. C. M. Riflemen
 Shipley, C. O., Lieut. Shrops. L. Inf.
 Short, E. G. M., Capt. late Leinster Reg.
 Shrubsole, R. F., Major 2nd Tower Hamlets R.V.
 Shute, *Sir* Charles C., KCB., Gen., Col. 6th Drags.
 Sibthorp, C. C. W., Capt. late 1st Drs.
 Sidmouth, *Rt. Hon.* Viscount.
 Silver, H. A., Col. 4th V. B. Essex R.
 Sim, C. A., Maj.-Gen. late R.E.
 Sim, E. Coysgarne Maj.-Gen. late R.E.
 Simpson, Cortland H., Rear-Adm. (ret'd.)
 Simpson, C. R., Capt. Linc. Regt.
 Simpson, F. C. B. B., Comr. R.N.
 Simpson, Frank, Surg.-Maj. (ret'd.)
 Simpson, H. G., Comr. (ret'd.) R.N.
 Simpson, J. Capt. 1st W. Y. Art. Vols.
 Simpson, R. H., Lt.-Col. late Staff Paym.
 Sinclair, H. M., Capt. R.E.
 Sinclair, Lord, Col. late 57th Regt.
 Sitwell, W. H., Capt. Northd. Fus.
 Skinner, M. W., Major R.E.
 Skinner, T. H., Lt.-Col. 3rd Bn. Yorks. L. I.
 Skipton, S. S., MD., Dep.-Surg.-Gen. M. S.
 Skrine, H. M., Col. late 1st V. B. Som. L. I.
 Slade, C. G., Col. late Rif. Brig.
 Slade, F. G., Col. R.A.
 Sleeman, C. W., Capt. (ret'd.) R.N.
 Slingsby, T., Capt. late R. H. Gds.
 Smart, Geo. J., Col. late R.A.
 Smith, C., Col. late 3rd Bn. E. Sur. Regt.
 Smith, C. B. L., Maj.-Gen. late Mad. S. C.
 Smith, E. L., Lt.-Col. 4th Bn. Durh. L. I.
 Smith, E. P., Lieut. R.A.
 Smith, G. E., Lieut. R.E.

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Smith, H. F., MD., D. Surg.-Gen. (retd.)
 Smith, M. G., Lieut. (retd.) R.N.
 Smith, M. W., CB., Gen., Col. 15th Huss.
 *Smith, P. G. L., Maj.-Gen. late R.E.
 Smith, P. H., Major Devon. Regt.
 Smith, *Sir* R. M., KCMG., Maj.-Gen. late R.E.
 Smith, S. B., Lieut. 1st Drag. Gds.
 Smith, W., Maj.-Gen. late R.A.
 Smith, W. W., Major R.A.
 Smith-Dorrien, H. L., DSO., Capt. Derbys. Regt.
 Smith-Neill, J. W., Lieut. Sco. Gds.
 Smith, S. C. U., Capt. R.A.
 Smith-Rewse, H. W., Major R.E.
 Smyth, G. J. F., Col. late Cold. Gds.
 Smyth, H., CB., Gen., Col. R. W. S. Regt.
 Smyth, H. A., CMG., Lieut.-Gen. R.A.
 Smyth, H. F., Major R.A.
 Smyth, J. H., CB., Maj.-Gen. late R.A.
 Smyth, J. S., Lt.-Col. late Leic. Regt.
 Smyth, *Hon. Sir* Leicester, Gen., KCB., KCMG.
 Smythies, R. H. R., Capt. S. Lanc. Regt.
 Snell, W. C. H., Lieut. R.N.
 Somersset, *Hon.* G. W. R., late Mid. R.N.
 Sondes, EARL, Lt.-Col. late East Kent Yeo.
 Soote, J. P., Major W. Yorks. Regt.
 Sotheby, *Sir* Edwd. S., KCB., Adm. (retd.)
 Spalding, H. Lt.-Col. late 2nd Batt. Rl. Mun. Fus.
 Sparks, R. W., Col. late 7th R. Fus.
 Spearman, H. R., Col. Beng. S.C.
 Spencer-Churchill, E., LORD, late Lieut. 3rd Brig. S. Div. R.A.
 Spicer, R. W., Capt. late 16th Lancers
 Spragge, F. P., Lieut. late R.E.
 Stafford, H. L. C. H., Capt. R.E.
 Stafford, MARQUIS of, Lt.-Col. 1st Suth. R.V.
 Stair, J., EARL of, Capt. late S. Gds.
 Stamer, L., Capt. 16th Lancers.
 *Stanhope, W. T. S., Capt. late 1st W. York. Yeo.
 Stanley, E., Major late 1st Bn. N. Staff. Regt.
 Stanley of Preston, LORD Fred. A., GCB., *ADC. to the Queen*, Col. 3rd Bn. R. Lanc. R.
 Stanley, *Hon.* E. G. V., Lieut. Gren. Gds.
 Stanuall, H. S. McC., Capt. R. Sc. Fus.
 Staples, F. P., Brig.-Surg. M. S.
 Stappylton, G. G. C., Lt.-Gen.
 Starr, G. L. H., Capt. late Innis. Fus.
 Stawell, G. D., Major Devon. Regt.
 *Stawell, W. St. L. A., Lt.-Col. late N. Cork Rifles
 Stebbing, F. A., Lt.-Col. late 96th Regt.
 Steele, *Rt. Hon. Sir* T. M., GCB., Gen., Col. Cold. Gds.
 Steevens, N., Col.
 Stephen, A. C., CB., CMG., late Lieut. 2nd Brig. Lanc. Div. R.A.
 Stephen, J. G., Maj. late R. Lanc. Mil. Art.
 Stephens, E., Lt.-Col. R.E.
 Stephens, F. S. M., Capt. late 2nd R. Middx. Mil.

Stephenson, *Sir* F. C. A., GCB., Gen., Col. York and Lanc. Regt.
 Stephenson, T. E., Major Essex Regt.
 Sterling, J. B., Col. (h.p.) late Cold. Gds.
 Stevens, A. J., Major 4th V.B. S. W. Bord.
 Stevens, G. M., Major R.A.
 Stevens, W., Col. late R. W. Surr. Regt.
 Stevens, C., Capt. Madras S.C.
 Stevenson, N., Maj.-Gen. late 87th Regt.
 Stevenson, W. G., late Lieut. S. Gds.
 Stewart, A. A., Maj.-Gen. late R.A.
 Stewart, *Sir* D. M., *Bart.*, GCB., GCSI., CIE., Gen. Ben. S. C.
 Stewart, R. McG., *ADC.* Col. R.A.
 Stewart, *Hon.* R. H., Capt. late 1st Bn. R. Highrs.
 Stewart, *Sir* W. Houston, GCB., Adm. (retd.)
 Stewart, *Hon.* W. J., Col. late 12th R. Lan.
 Stewart-Savile, W. S., Capt. E. Kent Regt.
 Stewart-Mackenzie, J. A. F. H., Major 9th Lancers
 Stewart, W. R., Lieut. R.E.
 Stirling, J. S., Col. late R.A.
 *Stirling, W., CB., Maj.-Gen. late R.A.
 *Stocker, M. E. C., Col. late R.A.
 Stockley, G. W., Col. (h.p.) R.E.
 Stokes, A., Major Army Pay Dept.
 Stokes, *Sir* John, KCB., Lt.-Gen. late R.E.
 Stokes-Roberts, E. R. B., Lieut. R.E.
 Stone, F. G., Capt. R.A.
 Stone, G. H., Maj.-Gen. late R.A.
 Stone, J. G., Major R.A.
 *Stoney, F. S., Lt.-Col. late R.A.
 Stopford, *Hon.* E. B. L. H., Capt. Rl. Irish Fus.
 Stopford, *Hon.* F. W., Major Gren. Gds.
 Stopford, H. R., Capt. Cold. Gds.
 Stopford, *Hon.* W. G., Lieut. R.N.
 Storer, A. T., Col. (h.p.) late R.E.
 Story, Philip C., Lt.-Col. (retd.)
 Stourton, A. P. J., Lieut. Eng. Mil. R.E.
 Stracey, H. H. D., Col. S. Gds.
 *Strafford, EARL of, Hon. Col. late 17th Middx. R. Vol.
 Strange, H. B., Lieut. R.A.
 Strange, R. G., Capt. R.A.
 Streetfeild, H., Capt. Gren. Gds.
 Street, E. L., Col. Devon. Regt.
 Strickland-Constable, F. C., Capt. Rl. H. Gds.
 Stringer, F., Major R. Welsh Fus.
 Stroud, E. J., Lieut. R. M. L. I.
 Stuart, A. R., Capt. R.A.
 Stuart, C., Gen., Col. 2nd Bn. D. of C. L. I.
 Stuart, E. A., Col., Lt.-Gov. Rl. Hos. Chelsea.
 Stuart, G. B., MB., Surg.-Maj. Gren. Gds.
 Stuart, J. F. D. C., Lt.-Col. late Gr. Gds.
 Stuart, W. J., Maj.-Gen. late R.E.
 Stucley, *Sir* George S., *Bart.*, Col. Devon Art. (W. Div. R.A.)
 Sturt, N. G., Col. late R.E.
 Sturt, R. R. N., Capt. Ben. S. C.
 Sudeley, LORD, late R.N.
 Sulivan, E. F., Capt. Hamp. Regt.
 Sulivan, G. L., Rear-Adml.
 Swaine, L. V., CB., CMG., Col. Rif. Brig.
 Swann, J. S., Capt. late 22nd Regt.

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*Sweny, G. A., Col. late R. Fus.
 Swettenham, G. K., Lieut. Rl. Irish Fus.
 *Swiney, G. C., Col. Comg. 32nd Regtl. Dist.
 late D. of Corn. L. I.
 *Swinfen, F. H., Col. late 5th Dr. Gds.
 Swinley, Geo., Col. R.A.
 Swinton, A., Col. R.A.
 Swithinbank, H. W., Lieut. late 11th Huss.
 Symington, R., Capt. 1st V. B. Leic. R.
 Symonds, C. E. H., late Lieut. R.A.
 Symonds, G. H., Capt., Rl. Irish Regt.
 Symons, W. P., Col. S. Wales Bord.

TALBOT, C. R. M., MP., Lord Lieut.
 Glamorganshire.

Talbot, *Hon.* R. A. J., CB., ADC, Col. late
 1st L. Gds.

Tanner, C. O. O., Lieut. 13th Bom. Inf.

Tanner, J. A., DSO., Capt., R.E.

Tarleton, A. H., late Lieut. R.N.

Tarleton, E. de L., Col. late R.A.

Tatham, W. J., Col. late R.A.

Taylor, *Sir* Alex., GCB. Gen., late R.E.

Taylor, G. L. Le M., Lt.-Col. late Bed. Regt.

Taylor, *The Rev.* H. A., MA., late Chaplain
 to the Forces.

Taylor, *Sir* R. C. H., KCB., Gen., Col. the
 Q.'s O. Cam. Highrs.

Taylor, St. J. S., Major late 11th Huss.

Teale, E. J. J., Capt. D. of Corn. L.I.

Teasdale, W., late Lt. 1st W. York. Art. V.

Teek, F., *H.S.H. DUKE* of, GCB., Hon. Col.
 1st City of London Art. V.

Telfer, C. E. D., Capt. Worc. Regt.

Temple Vere de L., Lieut. 19th Hus.

Templer, C. B., Lieut. late I. N.

Templer, J. G. E., Capt. 1st Bn. High. L. I.

Templetown, G. F., VISCOUNT, GCB., Gen.,
 Col. 2nd Life Gds.

Tenison, W., Capt. Manch. Regt.

Tennyson, J., Capt. late 17th Regt.

Terry, A. F., Maj.-Gen. late K. R. Rif. C.

Teschemaker, T. R., Maj. late R.A.

Thackeray, E. T., *G.C.*, CB., Col. late R.E.

Thackwell, O. M. R., Capt. R.E.

Thackwell, W. de W. R., CB., Maj.-Gen.,
 Col. 4th V.B. Liverpool Regt.

Theed, John H. W., Lieut. R.N.

Thelluson, A. G. B., Lt.-Col. late Cold. Gds.

*Thesiger, *Hon.* C. W., Maj.-Gen. late 6th
 Drs.

Thomas, A. B., Capt. R.N.

Thomas, A. H., Capt. A. S. Corps.

Thomas, E. A., Lt.-Col. late 7th Dr. Gds.

Thomas, H. J., Col. late R.A.

Thomas, H. R. D., Major Bo. S. Corps.

Thomas, J. W., CB., Lt.-Gen.

Thomas, Montagu, Capt. (retd.) R.N.

*Thomas, W. G., Major 2nd Bn. Man. Regt.

Thompson, C. H., Capt. late R.A.

*Thompson, C. W., Capt. 7th Dr. Gds.

Thompson, H., Col. late Ben. S. Corps

Thompson, J. C., Capt. late 26th Middx.
 R.V.

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Thompson, *Sir* Ralph W., KCB., Permanent
 Under-Secretary of State for War

Thompson, R., Major Devon. Regt.

Thompson, W. H., Col. late 1st K. Dr. Gds.

Thompson, W. W., Capt. 2nd V.B. Rl. Fus.

*Thomson, C. F., Major 7th Hus.

Thornton, E. E. D., Lieut. Rl. Mun. Fus.

Thornton, E. Z., Lt.-Col. late R. Lanc. Regt.

Thornton, F. S., Capt. Rifle Brigade.

Thuillier, *Sir* H. E. L., *Kt.*, CSI., Gen. R.A.

Thynne, R. T., CB., Col. late Gr. Gds.

Tillotson, L., Lt.-Col. late R.A.

Tilly, J. C., Capt. Bedf. Regt.

Timmis, I. A., Capt. 1st V.B. Q.'s Rl. W.
 Surr. Regt.

Tipping, A., Lt.-Col. late Gr. Gds.

Tipping, H. T. G., Lieut. (retd.) R.N.

Tisdall, A. L., Capt. R.A.

Tod, A. G. W., Lieut. Ches. Regt.

Tod, J. E., Lieut. W. Rid. Regt.

Todd, G., Major 3rd Mid. Art. Vols.

Todd, K. R., Col. R.E.

Toler, J. O. G., Major late 2nd Bn. High. L.I.

Tollemache, W. A., Capt. late 2nd L. Gds.

*Tompson, W. D., CB., Maj.-Gen. late Leic.
 Regt.

Toms, H., Lt.-Col. 3rd Bn. Devon. Regt.

Tongue, J. M. G., Col. Comdt. School of
 Musketry, Hythe, late S. Wales Bord.

Torkington, H., Major R.A.

Torrens, A., Capt. late 66th Regt.

Torrens, J. A. W. O'N., Capt. 2nd Drs.

Torriano, C. E., Col. late R.A.

Tottenham, F. St. L., Major R. Fus.

Tottie, J. B. G., Lieut. 4th W. York.
 Regt.

Toulmin, A., late H. E. I. C. S.

Tower, C., CB., Lt.-Gen.

*Travers, E. A., Major Ben. S. Corps.

Treffry, F., Lt.-Col. Staff Paym. A.P.D.

Tremayne, A., Lt.-Col. late 13th Lt. Drs.

Tremlett, F. S., Rear-Adm. (retd.)

Trench, C., Col. (h.p.) R.A.

Trench, *Hon.* C. G., Capt. late 1st. R. Drs.

Trench, *Hon.* W. Le Poer, Col. late R.E.

Trevelyan, H., Major late R. Innis. Fus.

Trevor, W. S., *G.C.*, Maj.-Gen. late R.E.

Trimen, R., Capt. late 35th Regt.

Tritton, F. B., Lt.-Col. late 18th Regt.

Trotter, H., Col. Gr. Gds.

Trotter, H., CB., Lt.-Col. R.E.

Trotter, J. K., Major R.A., *Gold Medalist*,
Military Essay, 1881

Troyte, C. A. W., Col. 3rd, V.B. Devon Regt.

Tryon, *Sir* George, KCB. Rear.-Adml.

*Tulloch, A. B., CB., Maj.-Gen. late Welsh
 Regt.

Tulloch, J. A. S., Lieut. R.E.

Tully, T., Lt.-Col. 4th V.B. E. Sur. Regt.

Tupper, Æ. de Vic, Col. late R.A.

Tupper, De Vic, Col. late 8th or King's

Tupper, G. Le M., Lieut.-Gen. late R.A.

Tupper, R. G. O., Lieut. R.N.

Turbervill, T. P., Lt.-Col. late R.A.

Turnbull, C. F. A., Major D. of Corn. L. I.

*Turnbull, J. F., Col. Canadian Huss.

Turnbull, J. R., Lt.-Col., late 1st R. Drs.

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Turner, A. E., Col. late R.A.
 Turner, T., Col. late 1st Bn. Sco. Rif.
 Twigg, W. J., Lieut. H.A.C.
 Tweedie, M., Maj.-Gen. late R.A.
 Twemlow, Edw. D'O., Lt.-Col. R.E.
 Twemlow, F. R., Capt. 4th Bn. N. Staff. Regt.
 Twentyman, A. C., CB., Col. Comg. 8th and
 40th Regtl. Dists. late R. Lan. Regt.
 *Twyford, H. R., Lt.-Col. late Hants R. Vols.
 Twyford, L. T. C., Lieut. 2nd N. Staff. Regt.
 Tylee, A., Col. late R.A.
 Tyler, C. W., Lieut. R.A.
 Tyndale-Biscoe, A. S., Capt. R.A.
 Tyndale-Biscoe, J. D. T., Lieut. 11th Huss.
 Tynte, M. C. S., Lt.-Col. late 4th Dr. Gds.
 Tyrrell, F. H., Col. Madras Inf.

UNDERWOOD, W. C., Lt.-Col. late 4th
 Huss.

Upperton, B., Lieut. Oxf. L.I.

*Utterson, A. H., Col. Comg. 17th Regtl.
 Dist. late Leic. Regt.

VALLAT, W. F., Lieut. 11th Middx. R.V.

Vallings, A., Col. Ben. S.C.

Vans-Agnew, J., Lieut. Mad. S. C.

Van-Straubenzee, T., CB., Col. late R.A.

Varlo, H., Capt. (retcd.) R. M. L. I.

Vaughan, *Sir* J. L., KCB., Gen. late Ben.
 S. C.

Vaughan, T. T., Capt. R.A.

Venner, L. S., Lt.-Col.

Vereker, *Hon.* F. C. P., Capt. R.N.

Verney, *Sir* Harry, *Bart.*, Major. late Gr.
 Gds.

Vernon, G. A., Lt.-Col. late Cold. Gds.

Vernon-Wentworth, B. C., Lieut. Gren. Gds.

Verschoyle, E. G., Lieut. Gren. Gds.

Versturne, H. P., Lieut. Lothian Regt.

Vetch, R. H., Col. R.E.

Vials, H. G., Capt. W. Yorks. Regt.

Viekerman, W. J., Col. 18th Middx. R.V.

*Vickers, C. B., Col., late 2nd City of Lond.
 R.V.

Villiers, *Hon.* G. P. H., CMG., Col. Gr. Gds.

Vincent, R. D., Capt. Rl. Dub. Fus.

Vyner, R. C. de Grey, Capt. late Gr. Gds.

Vyse, G. Howard, Col. late 2nd L. Gds.

WACE, R., Major R.A.

Waddy, J. M. E., Major Som. L. I.

Wahab, H. J., Lt.-Col. late A. P. D.

Wainwright, H., Lt.-Col. 2nd V.B. The
 King's (Liverpool Regt.),

Wait, A. McLean, Lieut. R.N.R.

*Wake, A. J., Col. late R.A.

Wake, R. W., Lt.-Col. (h.p.) R. Afr. Corps

Waldron, F., Capt. R.A.

Wale, *Rev.* H. J., late Lieut. 2nd Drs.

*Walford, N. L., Lt.-Col. (h.p.) R.A.

Walford, W. S., Major R.A.

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Walls, T. C., Capt. (21st Middx. R.V.) 7th
 V.B. K. R. R. C.

Walker, A., Col. R.A.

*Walker, A. G., Major R.A.

Walker, *Sir* C. P. Beauchamp, KCB., Gen.,
 Col. 2nd Dr. Gds.

Walker, D. C., Col. late R.E.

Walker, F. W. E. F., CB., CMG., Maj.-Gen.
 late S. Gds.

*Walker, G. G., Col. 3rd Bn. K. O. Sco.
 Bord., ADC.

Walker, *Sir* Geo. R., *Bart.*, Capt.

Walker, J. T., CB., Genl. late R.E.

Walker, M. C. B. F., Major K. R. R. Corps.

Walker, W., Capt. late 69th Regt.

Walker, W. F. D., Lieut. R.N.

Walker, W. T., Major 3rd Middx. R. V.

Walker-Mylne, Hercules, Lt.-Col.

Wallace, N. W., Lt.-Col. late K. R. Rif. C.

Wallace, R. H., Major R.A.

Wallace, W. A. J., Col. R.E.

Wallace, W. E., Col. late 18th R. I.

*Waller, G. H., Maj.-Gen. late 7th R. Fus.

Waller, S., Major R.E.

Walter, W. F., Lieut. Lan. Fus.

Walters, H. de L., Lieut. R.A.

*Walton, C. E., CB., Col. A. S. Corps.

Wantage, *LORD*, *U.C.*, KCB., Col. Comg.
 Home Counties Vol. Brigade, Col. 1st V.B.
 Rl. Berks Regt.

Ward, *Sir* E. W. KCMG., Maj.-Gen. late R.E.

Ward, F. H., Capt. R.A.

Ward, John Ross, Adm. (retcd.)

*Ward, Thos. Le H., CB., Rear-Adml.

Ward, *Hon.* W. J., Vice-Adm.

Warde, C. A. M., Lt.-Col. late R.A.

Warden, R., CB., Gen.

Waring, W. T., Capt. late Kent A. Mil.

Warre, F., Lieut. late E. Kent Mil.

Warre, *Sir* H. J., KCB., Gen., Col. 2nd Bn.
 Wilts Regt.

Warren, A. E., Maj.-Gen. late Seaf. Highrs.

Warren, *Sir* Charles, GCMG., KCB.,
 Maj.-Gen. late R.E.

Warren, D. S., CB., Maj.-Gen. late W. Y.
 Regt.

Warrender, J., Capt. Gren. Gds.

Warry, A., Lt.-Col. late R.A.

Warton, R. G., Major late Line. Regt.

Waters W. H. H. Capt. R.A.

Watling, F. W., Lieut. R.E.

Watson, A. J., Major Suff. Regt.

Watson, Burges, Capt. R.N.

Watson, C. E., Lt.-Col. late 18th R.I.

Watson, C. M., CMG., Major R.E.

*Watson, F. G. D., Col. Isle of Wight Arty.
 (S. Div. R.A.)

Watson, G. L., late Lieut. 1st L. Gds.

*Watson, H. J., Major 11th Huss.

Watson, L. A. Lieut. Leic. Regt.

Watt, F. E., CB., Com.-Gen.

Watts, C. N., Capt. Derbys. Regt.

*Watts, J. G., Col. Bom. S. C.

Waud, W. H., Capt. 3rd Bn. R. I. Rifles

Wavell, A. G., Major Norfolk Regt.

Wavell, A. H., Col. late 1st Bn. Welsh Regt.

Wavell, L., Col. late Ben. S.C.

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Webb, T., Major late R.E.
 Webb, W. F., late Lt. 17th Lancers
 Webber, C. E., CB., Maj.-Gen. late R.E.
 Webster, T., Lieut. 12th Beng. Inf.
 Wegg-Prosser, F. R., Lt.-Col. late 1st Mid.
 Art. V.
 Welch, F., Capt. late 2nd Bn. W. Rid.
 Regt.
 Weldon, F., Col. Madras Staff Corps.
 Wellesley, A. C., LORD, Col. Gr. Gds.
 Wells, Richard, Rear-Adml.
 Welsh, D. J., Maj.-Gen. late R.A.
 Welstead, H. M., Lieut. Leic. Regt.
 Wemyss and March, F., EARL of, Col. 7th
 Middx. Lon. Sco. R.V., *ADC. to the Queen*
 West, M. R., Lt.-Col. R.A.
 Westbury, R. L. P., LORD, late Lieut. Scots
 Gds.
 Western, J. S. E., Capt. Mad. S.C.
 Westmacott, S., Gen. late R.E.
 Westmorland, C. H. Major Ben. S. Corps.
 Weston, T. B., Major 20th Huss.
 Wethered, E. R., Lt.-Col. late Staff Paym.
 R.A.
 Wetherall, W. A., Major Bo. S. Corps
 Whaley, Hen. Capt. late 4th Bn. York. Regt.
 Wharnccliffe, E. M. G., EARL of, Col. 1st V.B.
 York and Lanc. R.
 Wheeler, J. R., Lt.-Col. late 29th Regt.
 Whetherly, W., Capt. T. H. Eng. Vols.
 Whiffin, H. W. S., late War Office
 Whinfield, C. W., Lt.-Col. late R.E.
 Whinyates, F. A., Col. late R. H. A.
 Whinyates, F. T., Maj.-Gen. late R.A.
 White, A. W., Lt.-Col. late R.A.
 *White, C. W., Major late 22nd Middx. R.V.
 White, F. B. P., Col. Commdg. *W*. I. Regt.
 Dépôt.
 White, H. S., Lieut. R.A.
 *White, *Hon.* H. F., Lieut. Gren. Guards
 White, J. B., Lieut. R.N.R.
 White, J. G., Major Middx. Regt.
 White, S. M., late Lieut. 2nd Herts R.V.
 White, W. L., Capt. R.A.
 Whitehead, G. H., Lieut. 24th Middx. R.V.
 Whitehouse, A., Chief Paym. (ret.) R.N.
 Whitla, W., Col. late Linc. Regt.
 Whitmore, *Sir* E. A., KCB., Gen., Col. 1st
 Bn. E. Lan. Regt.
 Whitting, J. E., Col. (h.p.) Hamp. Regt.
 Whyte, W. H., Vice-Adm.
 Wickens, S., Lt.-Col. 3rd Mid. Art. Vols.
 *Wickham, E. H., Lt.-Col. R.A.
 Wigram, H. H., Lieut. Scots Guards
 Wigram, G. J., CB., Col. Cold. Gds.
 Wigram, J. R., Capt. late Cold. Gds.
 Wilbraham, *Sir* Rich., KCB., Gen., Col. R.
 Fus.
 Wildbore, F., Assist.-Surg. late Cold. Gds.
 Wildman, C. W., Major late R. Ir. Fus.
 Wildman-Lushington, P., Lieut. K. O. Sco.
 Bord.
 Wildy, A. G., Sub-Lieut. R.N.A. Vols.
 Wilford, E. P., Major Glouc. Regt.
 Wilkin, W. H., Col. late 3rd Middx. A.V.
 Wilkinson, E. H., Capt. (ret.) R.N.
 Wilkinson, F. G., Lt.-Gen.

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Wilkinson, H. C., CB., Maj.-Gen. late 16th
 Lancers
 Wilkinson, H. G., Lt.-Col. late S. Gds.
 Willan, F. Major 4th Bn. Oxf. L.I.
 Willan, L. P., Comr. (ret.) R.N.
 Willes, *Sir* Geo. O., KCB., Adm. (ret.)
 Williams, D. W., Col. Madras Army
 Williams, E. A., CB., Lieut.-Gen. late R.A.
 Williams, G., Capt. R.E.
 Williams, G. D. R., Capt. R. Berks. Regt.
 Williams, H. B., Lieut. R.E.
 Williams, H. M., Capt. 1st Bucks R.V.
 Williams, Hugh P., Lieut. R.N.
 Williams, J. W. C., Gen. (ret.) R. M. A.
 Williams, O., Major 1st Bn. Suff. Regt.
 Williams-Drummond, *Sir* J. H., *Bart.*, Capt.
 Carmarthen Arty. (W. Div. R.A.)
 Willink, H. G., Lieut. 14th Middx. Inns of
 Court R.V.
 Willis, F. A., CB., Lieut.-Gen.
 Willoughby, J. F., Lt.-Col. 3rd Bombay
 Light Cavalry
 Willoughby, R. F., Major R. Sc. Fus.
 Wiltshire, *Sir* A. R. T., *Bart.*, Lt.-Col. late
 Scots Gds.
 Wilmot, F., Major late Bedf. Regt.
 Wilmot, *Sir* Hen., *Bart.*, *U.C.*, CB., Col.
 Comg. N. Midland Vol. Brigade, Col.
 1st V. B. Derbys. Regt.
 Wilson, *Sir* C. W., KCB., KCMG., FRS.,
 Col. late R.E.
 Wilson, C. W. H., Lt.-Col. R. War. Regt.
 Wilson, J. J., Col. late R.E.
 Wilson, J. O., Eng. (ret.) R.N.
 *Wilson, S. W. F. M., Maj.-Gen. late 18th R. I.
 *Wilson, W. H., Lt.-Col. late 1st Bn. Oxf.
 L. I.
 Wimberley, C. I., Lieut. Ben. S. C.
 Winchester, MARQUIS of, Lieut. Cold. Gds.
 Wingate, G. M., Capt. late R.A.
 Wingate, T. O., Lt.-Col. Ben. S. C.
 Winn, *Hon.* R., MP. Capt. Cold. Gds.
 Windsor-Clive, *Hon.* G. H. W., Col. late
 Cold. Gds.
 Winmarleigh, *Right Hon.* J. W., LORD, Col.
 3rd and 4th Bn. L. N. Lan. Regt. *ADC.*
to the Queen
 Wire, T. B., Lt.-Col. late 1st Surrey R.V.
 Wiseley, G. A. K., Capt. R.E.
 Wodehouse, A. P., Major 2nd Bn. Innis. Fus.
 Wodehouse, C., Capt. (ret.) R.N.
 Wodehouse, E. F., Major, R.A.
 Wodehouse, K. R. B., Lt.-Col. Highd. L.I.
 Wogan-Browne, F. W. N., Capt. 3rd Huss.
 Wollen, W. B., late Lieut. 20th Middx.
 R. V.
 Wombwell, A., Lt.-Gen.
 Wood, Cyril, Major Essex Regt.
 Wood, E., CB., Col. late R.E.
 *Wood, Henry, CB., Col. Commg. 9th Regt.
 Dist., late Rif. Brig.
 Wood, L. E., Major late 54th Regt.
 Wood, M. C., Major 10th Huss.
 Woodall, J. W., *Hon.* Lieut. R.N.R., Major
 late E. and N. York. Art. Mil.
 Woodbridge, F., Capt. late 2nd V.B. Middx.
 Regt.

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*Woodgate, E. R. P., Major R. Lanc. Regt.
 Woodgate, H. F., Lieut. S. W. Bord.
 Woodhead, H. J. P., Navy Agent.
 Woodman, L. J., Capt. late 3rd Lon. R.V.
 Woods, H. G., Lieut.-Gen.
 Woods, Wm. Fell, Capt. late 40th Mid.
 R.V.
 Woodthorpe, R. G., CB., Col. late R.E.
 Woodward, W. W., Col. late R.A.
 Woollett, W. C., Capt. R. Innis. Fus.
 Woolsey, O'B. B., Maj.-Gen. late R.A.
 Worsley, G. F., Maj.-Gen. late R.A.
 Wortham, H. Y., Maj.-Gen. late R.A.
 Wray, H., CMG., Lt.-Gen. late R.E.
 Wray, J. C., Lieut. R.A.
 Wright, A. H., Sub-Lieut. R. N. A. Vols.
 Wright, A. J. A., Capt. E. Lanc. Regt.
 Wright, H., Capt. Gord. Highers.
 Wright, W. H., Lt.-Col. late R.A.
 Wyllie, *Sir* W., GCB., Gen., Col. R. Dub.
 Fus.
 Wyndham, G. P., Lieut. 16th Lancers.

2710

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Wynne, E. W. L., Maj.-Gen. late Gr. Gds.
 Wynne, G., Gen. R.E.
 Wynne-Finch, C. A., Lt.-Col. late S. Gds.
 Wynne-Williams, B. R., Capt. 2nd V. B.
 Middx. Regt.
 YATES, H. PEEL, CB., Gen. R.A.
 Yonge, W. L., Maj.-Gen. late R.A.
 Yorke, H. A., Major R.E.
 Yorke, J., CB., Gen., Col. 1st Dragoons.
 *Yorke, P. C., Major R. Lanc. Regt.
 Young, C. F. G., Capt. Beng. S. C.
 Young, H. A., Lieut. R.A.
 Young, J. C., Capt. R. Sussex Regt.
 Young, J. S., Col. Dep. Commissary-Gen.
 Young, R. R., Major R. Highrs.
 Young, T., Maj. late 37th Regt.
 Younger, W., Lieut. late 16th Lancers
 Younghusband, C. W., CB., Lt.-Gen. late
 R.A.

LIST OF LIFE MEMBERS.

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ACHESON, *Hon.* E. A. B., Col. late Cold. Gds.
 Acland, F. E. D. Capt. late R.A.
 Acland, W. A. D., Capt. R.N.
 Acland-Troyte, J. E., Capt. Essex Regt.
 à Court, C., Capt. Rif. Brig.
 Adair, Charles Henry, Comr. R.N.
 *Adair, H. A., Maj. and Adj. 4th Bn. Oxf. L. I.
 Adams, H. C., Lt.-Col. 2nd Bn. Oxf. L. I.
 Adamson, R. I., Lt.-Col. late R. I. Regt.
 Adeane, E. S., CMG., Rear-Adm.
 Adye, G., Capt. Ben. S.C.
 Agar, E., Capt. R. E.
 Airey, J. M. C., Capt. (retd.) R.N.
 Airey, *Sir* J. T., KCB., Gen., Col. Rl. Innis. Fus.
 Airlie, Earl of, Major 10th Huss.
 Aitchison, H. C., Capt. R.N.
 Alcester, *Rt. Hon.* LORD, GCB., Adm. (retd.)
 Alexander, R., Col. R.A.
 Alexander, W. G., Lt.-Col. late 93rd Highrs.
 Allen, C., Capt. 4th W. R. Y. Art. Vols.
 Allen, J. L., Dep.-Lieut. of Perthshire
 Allen, J. R. H., Capt. R.A.
 Alleyne, D., Lt.-Col. late 37th Regt.
 *Alt, W. J., Lt.-Col. 22nd Middx. R. Vols.
 Amherst, *Hon.* Hugh, Capt. Cold. Gds.
 Anderson, J. H. A., Capt. Manch. Regt.
 Andoe, Hilary G., CB., Capt. R.N.
 Andrews, J. W., Major Devon. Regt.
 Anson, Charles V., Comr. R.N.
 Anson, Henry B., Lieut. R.N.
 Anstice, J. A., Col. 1st V.B. Shropsh. L. I.
 Anstice, R. H., Major late 29th Regt.
 Anstis, B. Du S., Lieut. R.N.R.
 Anstruther-Thomson, W., Lieut. R. H. Gds.
 Appleyard, R. L., Capt. 3rd Bn. Yorks. L.I. late R. Fus.
 Arbuthnot, C. R., Comr. R.N.
 Arbuthnot, W., CB., Col. late 14th Huss.
 *Archer, G. W., Lt.-Col. late R.E.
 Archer, R. H., Comr. R.N.
 Armstrong, *Sir* Alexander, KCB., LLD., FRS. (retd.), *Director-General Medical Department of the Navy*
 Armstrong, E. H., Lieut. Lanc. Fus.
 Armstrong, T., Major late 2nd W. I. Regt.
 Arnold, S., Col. Lanc. Arty. (S. Div. R.A.)
 Arthur, Albert F., Comr. (retd.) R.N.
 Atkinson, T., Capt. late 1st Royals
 Aylmer, H., Maj.-Gen. late R.A.
 Aylmer, F. A., Major R.A.

BABBAGE, H. P., Maj.-Gen. late Ben. S. C.
 Bacon, *Sir* H. B., *Bart.*, late Lieut. G. Gds.
 Badgley, W. F., Col. late Ben. S. C.
 Baillie, Hugh S., late Lieut. R.N.
 Bailey, E. H., Major 2nd V.B. E. Sur. Regt.
 Bailey, J. H. R., Lieut. Gren. Guards.
 Bainbridge, John H., Capt. R.N.
 Baird, John K. E., Vice-Adml.
 Baker, A. S. Lieut. R.A.
 Baker, E. M., Major R.A.
 Baker, W. W., Capt. R.E.
 Baldock, W., late Lieut. Rifle Brig.
 Balfour, E. J. A., Capt. 7th Midd. R.V.
 Balfour, F. W., Major late Rifle Brig.
 Balfour, K. R., Lieut. 1st Drag.
 Balfour, *Sir* Geo., KCB., M.P., Gen. R.A.
 Ball, E. A., Major R. War. Regt.
 Ball-Acton, Charles, CB., Col. late 1st Bn. S. York. Regt.
 Banks, H. D., Capt. K. R. R. Corps
 Banning, S. T., Capt. Rl. Mun. Fus.
 Barber, Basil C., Lieut. R.N.
 Barclay, A. K., Capt. late Sur. Yeo.
 Barclay, C., Lieut. 10th Huss.
 Barclay, D. W., Capt. late 90th L.I.
 Barker, C. A., Major 2nd Bn. R. Ir. Fus.
 Barnes, E., Lieut. R.A.
 Barnston, R. H., Dep.-Lieut. of Cheshire
 Barrett, L., Capt. R.A.
 Barreto, *The Baron*, FRSL., Capt. late 4th R. S. Middx. Mil.
 Barrow, C. T., DSO. Col. Scottish Rif.
 Barry, H. D., Comr. R.N.
 Barstow, J. A., Major. late 89th Regt.
 Bartley, J. C., Maj.-Gen. late 5th Ft.
 *Barton, E., Capt. late 1st Bn. Rl. Innis. Fus.
 Barton, G., CB., Col. R. Fus.
 Bartram, G. W., Major late R.E.
 *Bateman, H. W., Major, Staff Paym. A.P.D., late 31st Regt.
 Bates, C. E., Col. late Bengal S. C.
 Bates, H. S., Col. late 3rd Bn. Yorks. Regt.
 Battenberg, *H.S.H.* Prince Louis Alexander
 ot, GCB., Comr. R.N.
 Baxendale, J. W., late Lieut. 1st Middx. Art. Vols.
 Baxter, C. E., late Lieut. R.N.
 Baxter, C. F., Capt. Glouc. Regt.
 Baylay, F., Lieut. R.E.
 Bayley, J. A., Major late 52nd Regt.
 Baylis, E. W. D., FRGS., Major late 36th Middx. R.V.
 *Baylis, T. H., QC., Lt.-Col. late 18th Middx. R.V.

*Baylis, T. E., Major late 3rd Bn. Middx. Regt.
 Bayly, G. C., Major Army Pay Dept.
 Bayly, J., CB., Gen. late R.E.
 Baynes, G. S., Capt. K. R. Rif. C.
 Baynes, H. C. A., Lieut. R.N.
 Bayntun, W. H., Capt. late 12th Lancers
 Beaumont, Lewis A., Capt. R.N.
 *Beazley, Geo. G., Lt.-Col. late 83rd Regt.
 Bedford, DUKE OF, K.G., Col. 3rd V.B.,
 Bedfords. Regt. late Lieut. S. Gds.
 Belam, Henry, Lieut. R.N.
 Belfield, H. E., Capt. R. Munst. Fus.
 Bell, A. W. C., Major Bom. S. Corps
 Bell, Chas. Wm., late Lieut. 15th Hus.
 Bell, M. S., *U.C.*, ADC. Col. R.E.
 Bennet, F. W., Major R.E.
 Bennett, W., DSO., (h.p.) Col. late York
 Regt.
 Bentinck, R. W., Sub.-Lieut. R.N.
 Beresford, C. E. de la P., Capt. L'pool Regt
 Beresford, W. H., Capt. late Rifle Brig.
 Besant, W. H., Capt. Norf. Regt.
 Best, *Hon.* Henry, late Mid. R.N.
 Bethell, *Hon.* A. E., Lieut. R.N.
 Bethell, E. H., Capt. R.E.
 Betty, J. F., Col. late R.A.
 Bewicke, Calverley T., Lieut. (retd.) R.N.
 Bewicke, H. B. N., Major 1st Bn. Welsh
 Regt.
 Bewicke, R. C. A. B., Capt. K. R. Rif. C.
 Beynon, W. H., Maj.-Gen., late Bo. S. C.
 Bibby, A., Col. 4th Huss.
 Biddulph, M. W., Major Northd. Fus.
 Bidwell, J., FSA., late Lt. Queen's R.V.
 Bingham, G. W. P., CB., Gen., Col. 3rd Bn.
 E. Kent Regt.
 Birch, G. F., Lt.-Col. late 3rd Bn. Hamps.
 Regt.
 Birch, L. T., late Lieut. the King's Own
 1st Stafford Mil.
 Birley, H. A., Major Ches. Yeo.
 Birley, H. C., Capt. 2nd V.B. Manch. Regt.
 Birley, R. K., Lieut.-Col. 7th Lanc. A. Vol.
 Bisset, W. S. S., CIE., Major R.E.
 Black, B. W., Maj.-Gen. late R.A.
 Black, J. S., Capt. late 11th Huss.
 Black, William, late Mid. R.N.
 Black, W. G., Surg.-Maj.
 Blackburne, F. R., Capt. R.N.
 Blackburn, J. E., Capt. R.E.
 Blackwood, *Sir* Francis, *Bt.*, Capt. (retd.)
 R.N.
 Blagrove, H. J., Capt. 13th Hussars
 Blake, W. G., Maj. late 3rd Bn. Y. & Lanc.
 Regt.
 Blane, C. F., Capt. R.A.
 Bland, F. Maltby, late Mid. R.N.
 Blanshard, R., late Lt.-Gov. of Vancouver's
 Island
 Blundell, H. B. H., CB., MP., Col. late
 Gr. Gds.
 Bolitho, O. G., Lt.-Col. late 3rd Dr. Gds.
 Bonhote, J., Major 4th Bn. R. W. Kent Regt.
 Borland, Oswald, Capt. (retd.) R.N.
 Borton, *Sir* Arthur, GCB., GCMG., Gen.,
 Col. Norf. Regt.

Boulderson, S., Col. late 17th Lanc.
 Bourke, *Hon.* M. A., Comr. R.N.
 Bourke, P. J., Capt. R. Body Guard
 Boustead, John, Army Agent
 *Bowden-Smith, Nath., Rear-Adm.
 Bowker, J. H., Col. late Cape Mounted
 Police, FRGS., FZS.
 Bowles, H., Major York. Regt.
 Boyle, A. G., Lieut. 1st Bn. Som. L. I.
 Boys, R. H. H., Lieut. R.E.
 Boys, William H., Lieut. R.N.
 Bradford, E. E., Lieut. R.N.
 Brand, *Hon.* Thos. S., Capt. R.N.
 Brandreth, *Sir* Thomas, KCB., Adm.
 Brannill, B. A., Lt.-Col. late 86th Regt.
 Branson, C. E. D., Lt.-Col. H. M. I. L. F.,
 Ber.
 Brassey, LORD, KCB., Capt. late Cinque
 Ports Art. Mil.
 Brice, G. T., Maj.-Gen. late 17th Ft.
 Bridge, J., FRGS., Major 1st V.B. S. Lan.
 Regt.
 Bridgford, S. T., Major (retd.) R. M. A.
 Bright, *Sir* R. O., KCB., Gen., Col. Yorks.
 Regt.
 Broadwood, F., Capt. 3rd Bn. late 1st Bn.
 S. Staff. Regt.
 Broadwood, R. G., Capt. 12th Rl. Lancers.
 Brocas, B., late Lieut. 6th Dr. Gds.
 *Brodigan, F., Col. Comg. 28th Regtl. Dist.,
 late 1st Bn. Glouc. Regt.
 Brook, G. S., Ordn. Storekeeper
 *Brooke, C. K., Lt.-Col. late E. York. Regt.
 Brookes, F. A., Lieut. R.N.
 Brookfield, A. M., MP., Lt.-Col. 1st Cinque
 Ports R. Vols.
 Brown, James, Comr. (retd.) R.N.
 Brown, J. C., Col. Lan. Arty. (S. Div. R.A.)
 Brown, R., FRS., FLS., late Surg. Scotch
 Fencible Regt.
 Brown, W. B., Lieut. R.E.
 Brown, *Sir* W. R., *Bart.*, Col. late 1st Lanc.
 Art. V.
 Browne, A., Major R.A.
 Browne, H. R., Gen.
 Browne, *Ven.* Archdn. R. W., MA., late
 Chaplain to the Forces
 Browne, W. B., late Ensign 68th L. I.
 Browne, W. H., Major Ben. S. C.
 Brownlow, Earl, Col. 4th Bn. Linc. Regt.,
 and Lt.-Col. 2nd V.B. Bedf. Regt.
 Bruce, E. A., Col. M. S. C.
 Bruce, J. A. T., Capt. R.N.
 Bruce-Kingsmill, J. C. de K., Lieut. R.A.
 Brymer, J., Capt. late 5th Dr. Gds.
 *Buckle, C. E., Capt. R.N.
 Buckle, W. H., late Lieut. 14th Regt.
 Bucknill, J. T., Lt.-Col. late R.E.
 Buller, Alexander, CB., Rear-Adm.
 Buller, E. M. M., Col. late Rif. Brig.
 Buller, *Sir* R. H., *U.C.*, KCB., KCMG.,
 Maj.-Gen.
 Burdcr, J. W., Lieut. R.N.
 Burdett, *Sir* Francis, *Bt.*, Col. late 17th Lanc.
 Burghley, B. H. G., LORD, MP., Lt.-Col.
 4th Bn. Northn. Regt., late Gr. Gds.
 Burke, W. St. G., Lt.-Col. late R.E.

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Burne, *Sir* Owen T., KCSI., CIE., Maj.-Gen. late 20th Regt.
 Burn-Murdoch, J. F., Capt. 1st Dragoons.
 Burrard, S., Lt.-Col. late Gr. Gds.
 Burriess, E. N., Lieut. late Ceylon Rifles
 Burroughs, F. W., CB., Lt.-Gen.
 Burton, C. F., Lieut. Rl. Fus.
 Buxton, J. W. F., Lt.-Col. late R. Innis. Fus.
 Byng, *Hon.* C. C. G., Col. 1st Life Gds.
 *Byng, *Hon.* L. F. G., Capt. R. H. Gds.
 Byrne, H., Major 21st Middx. R.V.
 *Bythell, R., Col. Bo. S. C.
 *Bythessa, J., *U.C.*, CB., CIE., Rear-Adm. (retd.)

CAMBRIDGE, H.R.H. GEORGE W.F.C.
 DUKE OF, KG., KT., KP., GCB., GCSI., GCMG., GCIE., Field-Marshal
 Commander-in-Chief, *ADC to the Queen*,
 PRESIDENT OF THE INSTITUTION

CONNAUGHT and STRATHEARN, H.R.H.
 ARTHUR, W. P. A., DUKE of, KG., KT., KP., GCSI., GCMG., GCIE., CB., Lieut.-Gen. *ADC to the Queen*

Caborne, W. F., Lieut. R.N.R.

*Cadman, W. E., Lt.-Col. late 3rd Bn. Yorks. Regt.

Caldwell, C. B., Capt. late 66th Regt.

Calvert, A. M., Col. late R.A.

Call, C. F., Lt.-Col. late R.E.

Calley, J. D., Capt. 16th Lancers

Cameron, M. A., Capt. R.E.

Campbell, A., Col. late 46th Regt.

Campbell, A. A. E., Lieut. Ben. S. C.

Campbell, A. J., Lt.-Col. late 16th Regt.

Campbell, C. W., Maj.-Gen. Ben. S.C.

Campbell, D. L., late Lieut. 9th Lancers

Campbell, F. L., Lieut. R.N.

Campbell, F. S., Major R. Sussex Regt.

Campbell, H. J. F., CB., Capt. (rtd.) R.N.

Carey, W., CB., Col. late R.A.

Cargill, J., Lt.-Col. Otago Vols.

Carlyon, T. F., Lt.-Col. late 2nd Bn. W.

Rid. Regt.

Car michael, G. L., Lt.-Col. late 95th Regt.

Carpenter, Alfred, DSO., Comr. R.N.

Carr, Henry J., Capt. R.N.

Carr, R. E., Col. late Worc. Regt.

Carrington, C. R., LORD, GCMG., Gov. and

Comg.-in-Chief, Victoria, Lt.-Col. 3rd Bn.

Oxf. L. I., Capt. late R. H. Gds.

Carter, W. G., Major, Essex Regt.

Cartwright, H. A., Capt. 1st Bn. Durh. L. I.

Cary, L. F. B., Col. late Rif. Bde.

Casement, John, Lieut. R.N.

Cautley, H., Capt. late Suff. Regt.

Cavan, P. C., Lt.-Col. late 30th Regt.

Cave, George E., Sub-Lieut. R.N.

Cave, John H., CB., Adm.

Cave, L. T., Capt. late 54th Regt.

Cecil, LORD W., Capt. late Gren. Gds.

Chadwick, O., CMG., late Lieut. R.E.

Chalmers, P., Capt. late 3rd Dr. Gds.

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Chamberlain, *Sir* N. B., GCB., GCSI., Gen., Ben. I.

Chamberlain, Henry, Lieut. (ret'd.) R.N.

Champernowne, H., Lt.-Col. R.E.

*Champion, P. R., Lt.-Col. late 3rd Bn. Suffolk Regt.

Chapman, E. F., CB., Maj.-Gen. R.A.

Chapman, A. G., late Lieut. 5th Lancers.

Charlewood, E. P., Adm. (ret'd.)

Charteris, *Hon.* A. D., Lieut. Cold. Gds.

Chermside, H. C., CB., CMG., Col. R.E.

Chevallier, B. H., Comr. R.N.

Chichester, *Hon.* Aug. G. C., Lt.-Gen.

Ching, Lawrence, Comr. R.N.

Chisholm-Batten, A. W., Comr. R.N.

Christian, A. H., Lieut. R.N.

Christian, Harold, Sub-Lieut. R.N.

Christie, C. H. P., Major R.E.

Christie, S. H., MA., late Prof. R. M. Acad.

Christie, W. J., Capt. late Gren. Gds.

Church, A. G. H., Col. Comg. 63rd Regtl. Dist., late Manchester Regt.

Church, E. J., Capt. R.N.

Churchill, LORD Alfred, late Lieut. 83rd Regt.

Churchill, M., Major North'n Regt.

Clark, W., Lt.-Col. 1st Bn. Oxf. L. I.

Clark-Kennedy, A. W. M., FRGS., FLS., FSA., Capt. late Colds. Gds.

Clarke, A. C., Comr. R.N.

Clarke, G. C., CB., Gen., Col. 6th Dr. Gds.

Clarke, H. W., Lt.-Col. R.E.

Clarke, John S., Lieut. R.N.

Clarke, M. de S. M'K. G. A., Lt.-Col. late 50th Regt.

Clarke-Travers, *Sir* G. F., *Bart.*, Lt.-Col. late K. I. Rif.

Clauson, J. E., Lieut. R.E.

Clayton, M., Capt. late Northum. Yeo.

Clerk, G., CB., Maj.-Gen. late Rifle Brigade

Cleveland, Henry F., Capt. R.N.

Clifton-Brown, H., Lieut. late 2nd Bde. Lanc. Div. R.A.

Clinton, H. R., Lt.-Col. late Gr. Gds.

*Clutterbuck, T. St. Q., Lt.-Col. late 29th Punjab Infantry

Coats, T. G., Col. 2nd V. B. Arg. & Suth. Highlrs.

Cochrane, T. B. H., late Lieut. R.N.

*Cockburn, C. F., Maj.-Gen. late R.A.

Cockburn, C. J., Capt. R. War. Regt.

Cockburn, J. P., late Lt. 1st Warwick Mil.

Codrington, A. E., Capt. Cold. Gds.

Coke, *Hon.* W., Capt. Rifle Brig.

Cole, Joshua, Comr. (ret'd.) R.N.

Coles, W. Cowper, late Lieut. 3rd Bn. R.W. Sur. Regt.

Colleton, *Sir* R. A. W. *Bart.*, Capt. R. Welsh Fus.

Collett, H., CB., Brig-Gen. Beng. S.C.

Collings, W. A., Major Rl. Berks Regt.

Colman, G. M. H., MB., Surg., M. S.

*Cologan, J. F. Fitz-G., Col. Ben. S. C.

Combe, C., Capt. R. Horse Gds.

Conolly, A., Col. late Ben. S. Corps.

Conroy, H. G., Col. late Gr. Gds.

Conybeare, C. J. M., Comr. R.N.

Conybeare, F., Maj.-Gen. late R.A.
 Cooke, E., Capt. Scottish Rifles
 Cooke, J. G., Capt. late 7th Lane. Mil.
 Cooke, W., Lt.-Col. Madras S. C.
 Cookies, G., Lt.-Col.
 Cooper, D. S., Capt. late 1st Royals
 Cooper, J. C., Capt. late 8th Regt.
 Cooper, L. M., Col.
 Cooper, W., Capt. late Liverpool Rifle Brig.
 *Coote, Robert, CB., Adm. (retd.)
 Cope, E., late Lieut. Robin Hood R. V.
 Corbet, A. D., Major R.M.L.I.
 Corbet, W. O., Capt. late Cold. Gds.
 Corfe, Charles J., MA., Bishop of Corea, late Chap. R.N.
 Corry, Alvin C., Comr. R.N.
 Costobadie, H. H., Major R.A.
 Cotterill, James H., MA., FRs.
 Cowan, J. H., Capt. R.E.
 Cowley, N., late Lieut. 5th Dr. Gds.
 Cox, G., Col. 2nd Bn. Roy. I. Fus.
 *Cox, J. W., CB., Lt.-Gen.
 Craig, J., Col. late 3rd Bn. R. Ir. Rif.
 Craigie, R. W., Capt. R.N.
 Cramer-Roberts, C. J., Col. late Norf. Regt.
 Crawford, Alex. de C., Comr. (retd.) R.N.
 Crawford, C., Lt.-Col. late R.E.
 Crawley, H., Lt.-Col. late 20th Regt.
 Creak, Etrick W., FRs., Staff Comr. R.N.
 Crealock, J. N., CB., Col. A.-A.-Gen. Alder-shot, late 2nd Bn. Derby. Regt.
 Crichton, C. E., Lt.-Col. S. Ind. Rail. Vol. Corps
 *Croft, R. B., FLS., FRMS., Major Herts Yeo., Lieut. (retd.) R.N.
 Crofton, Duke A., Comr. R.N.
 *Croker-King, C. E., Lt.-Col. late A.P.D.
 Crole, G. S., Major
 *Cronin, A. C., Capt. late 19th Mid. R.V.
 Crook, H. T., Capt. 1st Lane. Eng. Vol.
 Crookenden, H. H., Major R.A.
 Crosse, T. R., Col. Comdt. 3rd Bn. N. Lan. Regt.
 Crozier, R. P., Lt.-Col. late 1st E. Sur. Regt.
 Cruickshank, J. D., Lt.-Col. R.E.
 Crutchley, C., Gen., Col. R. Welsh Fus.
 Crutchley, C., Major Scots Gds.
 Culme-Seymour, Sir M., Bart., Vice-Adm.
 *Cuming, W. H., Rear-Adm. (retd.)
 Cunningham, J., Capt. Essex Regt.
 Cuppidge, A., late Cornet 4th Dr. Gds.
 Curling, J. J., late Lieut. R.E.
 Currie, W., of Linthill, late Lieut. Edinb. Mil.
 Curtin, F. J., Major 2nd Bn. Glouc. Regt.
 Curtis, H., Capt. late 1st Mid. Art. V.
 Curtis, J. G. C., Major 2nd Bn. Oxf. L.I.
 Curzon-Howe, Hon. A. G., Capt. R.N.
 Cust, Sir Charles L., Bart., Lieut. R.N.
 Cust, H. E. P., Lieut. R.N.
 Custance, R. N., Capt. R.N.
 Custance, Sir H. F., KCB., Col. 3rd Bn. Norf. Regt.
 Cutlar-Fergusson, R., Capt. late Scots Gds.

DALE, A. T., Capt. R.N.
 Dalgety, R. W., Col. York and Lane. Regt.
 Dalton, Rev. J. N., MA., CMG., late R.N.
 Dalkeith, EARL of, late Lieut. R.N.
 *Daly, R. T. A., Lt.-Col. Georgetown Mil.
 Dalrymple, J. H. N. G. H., Viscount, Maj. late R. Horse Gds.
 Daniell, E. S., Lt.-Col. late 102nd Regt.
 Daniell, W. H. M., Lieut. R.N.
 Darwin, L., Major R.E.
 Daubeney, Sir H. C. B., GCB., Gen., Col. 2nd Bn. Bor. Regt.
 Davidson, P. L., Capt. 5th V.B. Gord. Highrs.
 Davidson, Stuart, Capt. R.E.
 Davidson, W. L., Major R.A.
 Davis, H., Col. late Worc. Regt.
 Davis, Sir John F., Bart., KCB., Dep. Lieut. of Gloucestershire
 Davis, R. P., Col. late Ben. S. C.
 Davison, T., Col. 16th Lancers
 Dawe, C., Major late 8th or King's
 Dawnay, Hon. Eustace H., late Lt. Cold. Gds.
 Dawson, H. C., Major, Staff Paym. A. P. Dept.
 Dawson, Hon. R. M. W., Capt. late 2nd Bn. Gord. Highrs.
 Dawson, W., Capt. R.N. (retd.)
 Dawson, W. H., Capt. late 6th Innis. Drs.
 de Bourbel, R., LE MARQUIS, Maj.-Gen. late R.E.
 de Jersey, C., Capt. R.A.
 Deane, G., Major late 1st R. Sco. Regt.
 Deane, H. C., late Lt. 17th Regt.
 Deasy, H. H. P., Lieut. 16th Lancers.
 Deedes, W. H., DSO., Maj.-Gen. Rif. Brig.
 Delap, J. B., Capt. Rl. Bucks Yeo.
 Denison, John, Lieut. R.N.
 Dennis, J. B., Maj.-Gen. late R.A.
 Dennis, M. S. T., Lt.-Col.
 Derby, The EARL of, KG, Col. 1st V. B. Liverpool Regt.
 Derriman, S. H., CB., Adm. (retd.)
 De Salis, W., Lieut. R.N.
 De Saumarez, LORD St. Vincent, J., Col.
 Dickens, H. F., Capt. and Quar.-Mar. 1st Middx. R.V.
 Dickinson, E., Major R.E.
 Dickson, J. B. B., Col. 5th Drag. Gds.
 Digby, LORD, Col. late Cold. Gds.
 Dixon, Matthew, Capt. (retd.) R.N.
 Domville, Sir W. C. H., Bart., Capt. R.N.
 Donaldson, John, C.E., late Engineer I.N.
 Donner, C. S., Capt. R.N.
 Donovan, E. W., Gen.
 Dooner, W. T., Lt.-Col. Rl. Innis. Fus.
 *Doughty, C., Maj. and Adj. 4th Bn. Shrops. L. I.
 Doughty, F. Proby, Capt. (rtd.) R.N.
 Douglas, Angus W. S., Lieut. R.N.
 Draffen, W. P., Col. late 4th Bn. Bord. Regt.
 *Drake, H. D., Capt. R.M.A.
 Drax, J. S. W. E., Capt. late E. Kent Mil.
 Druitt, E., Major R.E.
 Drummond, A. M., Capt. late Rifle Brig.
 Drummond, C. G. A., Capt. late Rifle Brig.

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Drummond, Edmund C., Capt. R.N.
 Drummond, *Hon. Sir J. R.*, GCB., Admiral
 (ret'd.)
 Drury, C. C., Capt. R.N.
 Drury, E. R., CMG., Lt.-Col. Comg. Field
 Art. Queensland Defence Forces
 Dugmore, W. F. J., Lt.-Col. late S. Gds.
 Duke, J. C., Major W. R. Regt.
 Dundas, P., Col. late 96th Regt.
 Dunn, R. G., Capt. late 9th Regt.
 Dunlop, H. D., Lt.-Col. late R.A.
 Dunlop, M. J., Capt. R.N.
 Durand, A. G. A., Major Ben. S. C.
 Durnford, C. D., Lt.-Col. Assist. Com.-Gen.
 of Ord.
 *Durrant, Francis, CMG., Capt. R.N.
 Dugate-Dugate, Richard, late Mid. R.N.
 Dutton, W. H., Col.
 Dyson-Laurie, J. D., Col. late Border Regt.

EDINBURGH, H.R.H. A. E. A., DUKE
 OF, KG., KT., GCB., KP., GCSI.,
 GCMG., GCIE., ADC., Adm.
 Earle, S., Lieut. Colds. Gds.
 Ebury, LORD, Capt. late Flint Yeo.
 Eden, A. D., Lt.-Col. late Sco. Rif.
 Eden, W. T., Col. late Bom. Army.
 Edgar, the *Rev. J. H.*, late Lieut. R.A.
 Edwards, C. G., Col. 2nd W.Y. Yeo. Cav.
 Egerton, G. G. A., Capt. Sea. Highrs.
 Elliot, E. H. M., Capt., S. Lanc. Regt.
 Elliot, *Hon. W. Fitz-W.*, Lt.-Col. late Arg.
 and Suthld. Highrs.
 Elliott, H. V. W., Lieut. R.N.
 Ellis, A. E. A., CSI., Maj.-Gen. late Gr. Gds.
 Ellis, R., Capt. late H.A.C.
 Ellison, G. F., Lieut. L. N. Lan. Regt.
 Elphinstone, H. J., Lieut. High. L.I.
 Elwes, R. H. H. E., Capt. late 12th Regt.
 England, W. G., Capt. R.N. (ret'd.)
 English, T., Major R.E.
 Erskine, James E., Rear-Adm.
 Eustace, J. B., Lieut. R.N.
 Evans, E. R., Major Rl. Welsh Fus.
 Evans, T. M., Major Tasmania Art. Vols.
 Evans, *Sir T. W.*, *Bart.*, Dep. Lieut. Derby,
 Lt.-Col. late Derby Yeo.
 Everitt, S. G., Lieut. Rl. W. Fus.
 Ewart, C. B., CB., Lieut.-Gen. late R.E.
 Ewart, J. H., Major 3rd Bn. Ches. Regt.
 Ewbank, W., Lieut. R.E.

FABER, W., late Lt. 14th Lt. Drs.
 Fairfax, Henry, CB., Rear-Adm.
 Fane, Charles G., Capt. R.N.
 Fanshawe, *Sir Edward Gennys*, GCB., Adm.
 (ret'd.)
 Farmer, W. R. G., Capt. late Gr. Gds.
 Farquhar, H. R., Lt.-Col. late 24th Regt.
 Farquharson, F., Gen.
 Farquharson, G. M'B. B., Maj.-Gen. late
 Bom. Staff Corps
 *Farquharson, M. H., Col. R. M. L. I.

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*Fawcett, R. H., Lt.-Col. late W. Rid. Regt.
 Feilden, H., Capt. late 21st R. N. B. Fus.
 *Feilden, O. B., Lt.-Col. late 78th High.
 Feilding, G. P. T., Lieut. Colds. Gds.
 Feilding, *Hon. P. R. B.*, CB., Lieut.-Gen.
 Fenner, E., Capt. 3rd Middx. Art. Vols.
 Ferguson H., Lieut. 2nd Middx. R. Vols.
 Fergusson, C., Lieut. Gren. Gds.
 *Ferris, John, Comr. R.N.
 Festing, E. R., Maj.-Gen. late R.E.
 Field, A. M., Comr. R.N.
 *Field, E., Rear-Adm. (ret'd.) M.P.
 Fife, J. G., Lt.-Gen. late R. E.
 Filliter, C. F., Capt. Bed. Regt.
 Fincham, H. G., Capt., Dep. Assist. Com.-
 Gen. of Ord.
 Fisher, E. R., Capt. late 4th R. I. Dr. Gds.
 *Fisher, John A., CB., ADC., Capt. R.N.
 Fisher, J. F., Lieut. R.A.
 *FitzClarence, *Hon. Geo.*, Capt. (ret'd.) R.N.
 FitzGeorge, A. A. F., Capt. R.N.
 FitzHenry, C. B., Lieut. S. Staffd. Regt.
 Fitzherbert, W. H. M., Major late Rif. Brig.
 Fitzmayer, *Sir James W.*, KCB., Gen. R.A.
 FitzWygram, *Sir F. W. J.*, *Bart.*, MP.,
 Lt.-Gen., Col. 3rd Huss.
 Fleming, E. W., Capt. R.A.
 Fletcher, H. M., Capt. late R. London Mil.
 Florence, H. L., Major 22nd Middx. R.V.
 Fogo, J. M. S., Surg.-Gen.
 Foley, *Hon. F. C. J.*, Maj. 3rd Bn. Derby.
 Regt.
 Foljambe, G.S., Capt. 4th V.B. Derbys. Regt.
 Forbes, Wyndham, Mid. R.N.
 Forde, L., Capt. R. A.
 Fox, W. V., Lt.-Col. 3rd V. B. Ches. Regt.
 *Frampton, Cyril, Lt.-Col. (ret'd.) R. M. L. I.
 Fraser, *Hon. A. W. F.*, Lt.-Col. late Gr. Gds.
 Fraser, T., CMG., Col. R.E. **Cold Medal-**
list (Extra), Military Essay, 1879
 Fraser, *Sir W. Aug.*, *Bart.*, Capt. late 1st
 Life Gds.
 Franklen, Rich., late Lt. 1st L. Gds.
 Freeland, H. W., Dep.-Lieut. Sussex
 Freeman, F. H. P. W., Lieut. R.N.
 Freeman, T. A., Major E. Surr. Regt.
 Fremantle, *Hon. Sir Edmund R.*, KCB.,
 CMG., Rear-Adm., **Cold Medalist,**
Naval Essay, 1880
 Frere, W. A. J., Major R. Scots Fus.
 Frith, Cockayne, Capt. late 38th Regt.
 Fuller, T., Capt. late 18th Huss.
 Fullerton, J. D., Capt. R.E.

GAIRDNER, Innes, Lieut. R.N.
 Galbraith, W., CB., Col. late Shrop. Regt.
 Galloway, A. A. C., Lieut. R. N.
 Gardiner, A. M., Comr. R.N.
 Gardiner, H. L., CB., Gen. late R.A.
 Gardiner, J., Capt. late 5th Dr. Gds.
 Gardner, C. H., Lt.-Col. late Derby Regt.
 Garnons-Williams, R. D., Capt. Rl. Fusiliers
 Gascoigne, F. C. T., Hon. Col. 2nd York.
 Eng. Vols.

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Gaselee, A., Lt.-Col. Ben. S. Corps.
 Gaskell, Frederick, Comr. (retd.) R.N.
 *Gassiot, Sebastian, Comr. (retd.) R.N.
 Geddes, J. G., Lt.-Col.
 Geddes, J. G., Lieut. R.A.
 George, T. B., late Lieut. 13th L.I.
 Gerard, F., Col. late Lanc. Huss.
 Gibbings, H. C. C., Capt. R. Innis. Fus.
 Gibson, H. W. S., Capt. R.N.
 Gibson, R., Capt. late 28th Regt.
 Giffard, G. A., Comr. R.N.
 Gildea, J., FSA., FRGS., Lt.-Col. 4th Bn. R. War. Regt.
 Gillam, W. J., Col.
 Gleich, COUNT A. E. W., Lieut. Gren. Gds.
 Gleich, H.S. Highness COUNT, Vice-Adm. (retd.)
 *Glen, A., Lt.-Col. Linc. Regt.
 Gloag, A. R., Lt.-Gen. late R.A.
 Goddard, A. L. Major late Rl. Wiltshire Yeo.
 Godfrey-Faussett, E. G., Lieut. R.E.
 Godman, A. F., Col. 1st Vol. Bn. York. Regt.
 Godman, C. B., Major 4th Bn. R. Suss. Regt.
 Godman, R. T., Maj.-Gen. late 5th D. G.
 Godman, S. H., Lieut. Sco. Gds.
 Goff, G. L. J., Capt. Arg. & Suth. Highrs.
 Goldie, J., Col., A.A.-General, Canada, late 6th Dr. Gds.
 Golding, E. W., Col. late Derby. Regt.
 Gooch, T. S., Lieut. R. N.
 Gooddy, E. C., Capt. late 44th W.Y.R. Vols.
 Goodfellow, W. W., CB., Lt.-Gen. late R.E.
 Gordon, LORD Douglas W. C., late Lieut. Cold. Gds.
 Gordon, A., Major 3rd Middx. Art. V.
 Gordon, L. A. O., Lieut. R.A.
 Gordon, W., Lt.-Col. late 25th Regt.
 Gordon, W., CIE., Lieut.-Gen. Beng. S. C.
 Gordon, W. E. A., CB., Adm. (retd.)
 Gore, J. A., Major late 1st Bn. High. L. I.
 Gorman, W. J., Capt. late Ceylon Rifl.
 Gosselin-Lefebvre, B. M. O. H., Lieut. late Cold. Gds.
 Gosset, M. W. E., CB., Col. 1st Bn. Dorset. Regt.
 Gowan, W. E., Lt.-Col. Ind. Local Forces Ben.
 Graham, Andrew, MD., Fleet-Surgeon (retd.)
 Graham, Chas. E. F. C., Lieut. late R.N.
 *Graham, C. S., Lt.-Col. late R.A.
 Graham, Cyril, late Governor Red River Settlements
 Graham, H., Capt. 20th Huss.
 Graham, J., Capt. 3rd Bn. R. W. Sur. R.
 Graham, R. W., Capt. Middx. Regt.
 Graham, Walter, H. B., Comr. R.N.
 Graham, Sir Wm., KCB., Vice-Adm.
 Granger, H. T., Major late L'pool Regt.
 Grant, A., Capt. late 61st Regt.
 *Graves, F. J., Col. 20th Hus.
 Gray, C. G., Lt.-Col.
 Greatwood, H. F., Lt.-Col. late E. Surr. Regt.

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*Grenfell, Hubert H., Capt. R.N. (retd.)
 Gretton, G. Le M., Capt. 3rd Bn. R. War. R.
 Grey, Sir George, KCB., Capt. late 53rd Regt.
 Grey, Harry Geo., Lieut. R.N.
 Grey, H. R. E., Capt. R.N. (retd.)
 *Grover, G. E., Col. R.E.
 Grubb, A., Lt.-Col. late R.A.
 Gunter, R., MP., Col. 3rd Bn. York Regt.
 Gurdon, Thornhagh Philip, Comr. late R.N.
 Gurdon, P., late Lieut. Cold. Gds.
 HAIG, C. T., Maj.-Gen. R.E.
 Haig, D. Lieut. 7th Hus.
 Haig, H. de H., Capt. R.E.
 Hales, A., Maj.-Gen. late Rl. Innis. Fus.
 *Halford, Sir Henry St. J., *Bart.*, Col. 1st Vol. Bn. Leic. Regt.
 *Halkett, J. C. C., Lt.-Col. late Stirl. Mil.
 Hall, M., Capt. late R. E. Middx. Mil.
 Hall, J. P., Lt.-Col. late Staff-Paym. A.P.D.
 Hall, T., Lt.-Col.
 Hall, W. H., Capt. R.N.
 Hallowell, Edw., Dep.-Lieut. of Middlesex
 Halsey, A., Sub-Lieut. R.N.
 Hamilton, C. E., MP., Lt.-Col. late 19th Lane. R.V.
 Hamilton, Sir C. J. J., *Bart.*, CB., Col. late Scots Gds.
 Hamilton, Sir Edw. A., *Bart.*, Capt. late Cold. Gds.
 Hamilton, F. Tower, Lieut. R.N.
 Hamilton, H. B., Lt.-Col. 14th Hus.
 Hamilton, Sir J. J., *Bart.*, Lt.-Col.
 Hammersley, F., Major Lan. Fus.
 Hammick, R. F., Capt. R.N.
 Hammill, Tynte F., Capt. R.N.
 Hammond, A. G., *U.C.*, DSO., Lt.-Col. Ben. S.C.
 Hammond, P. H., Major R.A.
 Hamond-Graeme, D., Lieut. R.N.
 *Hand, G. Weightman, Capt. R.N.
 Hanna, H. B., Col. late Ben. S. C.
 Hanna, W., Capt. R.A.
 Harcourt, E. W., Col. 1st Cinque Ports Arty. Vols.
 Hardinge, Edward, CB., Vice-Adm. (retd.)
 Hardinge, H., Lt.-Col.
 Hare, H. J., Major late 4th W. York. Mil.
 Hare, T. L., Lieut. late Scots Gds.
 Harfield, W. H., Lt.-Col. Mid. Yeo. Cav.
 Harman, Sir G. B., KCB., Maj.-Gen.
 Harmar, C. D'O., Lt.-Col. late Dorset Regt.
 Harris, J. B., Capt. late 24th Regt.
 Harrison, C. E. C. B., Capt. R. W. Kent Regt.
 *Harrison, Sir Richard, KCB., CMG., Maj.-Gen. late R.E.
 Harrison, R. J., Lt.-Col. 4th Bn. S. W. Bord.
 Harrison, W. A., Surgeon late H. Art. Mil.
 Harston, C. G., Capt. Royal Grenadiers of Canada, late R. M. L. I.
 Hart, A. FitzR., CB., Col. 1st Bn. E. Surr. R.
 Hart, H. H., Major R.E.

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Hart, R. C., *U.C.*, Col. R.E.
 Hart, Wyndham, Major 1st Middx. R.V.
 Harvey, R. N., Lieut. R.E.
 *Harvey, J. W. F., Comr. (retd.) R.N.
 Harworth-Booth, B. B., Lt.-Col. late 22nd
 E. York Art. V.
 Haswell, W. H., Vice-Adm. (retd.)
 Hawes, A. B., Capt. late Beng. Army
 Hawkins, A. T., Capt. late 4th Midd. R.V.
 Hawkins, E., Capt. late 22nd Regt.
 Hawkins, *Sir* J. S., KCMG., Gen. R.E.
 Hay, A. E., Capt. R.A.
 Hay, E. O., Major R.A.
 Hay, James B., Comr. R.N.
 Hay, J. Beckford Lewis, Adm. (retd.)
 Hay, J. F. D., Major late 4th Bn. R. Se. Fus.
 Hay, the *Right. Hon. Sir* John C. D., *Bart.*,
 KCB., DCL., FRS., Adm. (retd.)
 Haygarth, F., Lt.-Col. late S. Gds.
 Hayne, C. S., Col. 3rd Bn. Devon. Regt., M.P.
 Haynes, C. E., Capt. R.E.
 Headlam, J. E. W., Lieut. R.A.
 Heath, F. C., Major R. E.
 Heath, Herbert L., Lieut. R.N.
 Heathcote, C. G., Major, late Northd. Fus.
 Heathcote, F. A., late Lieut. 81st Regt.
 Heber-Percy, R. J., Major Rif. Brig.
 Helsham-Jones, H. H., late Col. R.E.
 Hemery, E., Col. late R.E.
 Henderson, G., Major 1st V.B. Q.'s O. (Rl.
 W. Kent Regt.)
 Henderson, W. H., Capt. R.N.
 Hendriks, C. L., Lieut. Rl. Mun. Fus.
 Heneage, A. R., Capt. 5th Drag. Gds.
 Heneage, Algernon W., Mids. R.N.
 Hemming, S., CB., Lieut.-Gen.
 Hennel, R., DSO., Lt.-Col. late Bom. Army.
 Henriques, E. N., Major R.A.
 Herbert, *Hon.* A. W. E. M., late Lieut. 7th
 Huss.
 Herbert, E. W., Major K. R. Rif. C.
 Herbert, I. J. C., Col. Gren. Gds.
 Hewitt, A. J., Capt. late Queen's Westr.
 R.V.
 Heygate-Lambert F. A., Capt. Middx. Yeo.
 Heywood, J. J., Maj.-Gen. late Glouce. Regt.
 Heyworth, C. F., Lieut. Rl. Fus.
 Heyworth, G. F., Major late 3rd Batt. Welsh
 Regt.
 Hibbert, F. D., Col. late Bucks Yeo.
 Hichens, T. S., Lieut. R.A.
 Hickman, H. O. D., Lieut. York. Regt.
 Hieks, C. P. G., Capt. R.N.
 Hieks, W. J., Capt. R.A.
 *Hildyard, H. J. T., Col. late High. L. I.
 *Hincks, A. S., Capt. late 76th Regt.
 Hinde, W. H., Capt. R.E.
 Hobart-Hampden, *Hon.* H. M., Major late
 103rd Regt.
 Hodge, *Sir* E. C., GCB., Gen. Col. 4th Dr.
 Gds.
 Hogg, A. G. F., CB., Brig.-Gen. Bom. S. C.
 Holbech, E. A., Comr. R.N.
 Holbrook, E. N. W., Lt.-Col. R. M. L. I.
 Holdich, *Sir* E. A., KCB., Gen., Col. Middx.
 Regt.
 Holdich, T. H., Lt.-Col. R.E.

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Holford, R. S., Dep.-Lieut. of Gloucester
 Holland, *Hon.* C. T., Lieut. Cold. Gds.
 Holland, J. Y., Lt.-Col. (retd.) R. M. L. I.
 Holland, S. C., Capt. R.N.
 Hollist, E. O., Lt.-Col. late R.A.
 Holmes, Thomas, Comr. (retd.) R.N.
 Holmes, P. R., Col. Comdt. R. M. L. I.
 Hoole, J., Major 3rd Bn. York. Regt.
 Hooper, R. W., Major
 Hope, H. W., Capt. late Gr. Gds.
 *Hope, J. E., Maj.-Gen. late R.A.
 Hope, John, Capt. (retd.) R.N.
 Hope, W., CB., Gen.
 Hordern, L. H., Lieut. R.N.
 Hornby, G. S. P., Capt. Rif. Bde.
 Hornby, J. F., Col. late 12th Lancers
 Horton, S. G., Lieut. R.A.
 Hoskins, *Sir* A. H., KCB., Vice-Adm.
 Hoskyn, R. F., Comr. R.N.
 Houldsworth, W. J., Major Lanark Yeo. Cav.
 Houstoun, Geo. L., Capt. 4th Bn. Arg. and
 Suthld. Highrs.
 Houstoun, Wallace, Adm. (retd.)
 Hovell, H. de B., Lieut. Wore. Regt.
 Howard, H. R. L., Capt. 16th Lancers
 Howard-Vyse, E., Lieut.-Gen.
 Hubbard, C. J., Lt.-Col. late Gren. Gds.
 Hudleston, R., Lieut. R.N.
 Huleatt, H., Capt. R.E.
 Hulse, *Sir* Edwd., *Bart.*, Lt.-Col. late S.
 Hants Mil.
 Humbley, W. W. W., Lt.-Col. late 9th
 Royal Lancers
 Hurme, *Sir* R., Maj.-Gen. late 55th Regt.
 Hurme, *Sir* R., KCB., Lt.-Gen.
 Hunt, H. E., Major late Robin Hood R.V.
 Hunt, H. T. C., late Lieut. 74th Highrs.
 Hussey, W. C., Capt. R.E.
 Hutchison, W. B., Fleet Paym. R.N.
 *Hutelinson, A. H., Maj.-Gen. late R.A.
 Hutton, E. T. H., Lt.-Col. late K. R. Rif. C.
 *IMLACH, R. W., Col. Georgetown Mil.
 Inglefield, E. F., Lieut. R.N.
 Inglefield, N. B., Capt. R.A.
 Inguis, R. W., Major Lond. Irish R. Vol.
 Inglis, T. D., Capt. R.A.
 Inglis, W. R., Lieut. Norf. R.
 Ingram, C. W., Major 1st Glamorgan.
 Art. V.
 Innes, F. N., Lt.-Col., late R.A.
 Irving, H., Major 3rd Bn. K.'s O.Sco. Bord.
 Irving, J. C. S., Major A. P. D.
 Irving, L. A., Surg.-Maj. M.S.
 JACKSON, W. H. M., Lt.-Col. late 81st
 Foot
 Jacob, S. S., Col. Bombay S. Corps.
 Jaffray, E. W., Lieut. 13th Hus.
 Jago-Trelawny J., Maj.-Gen. late High. L.I.
 James, W., Major late 26th Regt.
 Janvrin, F., late Ens. 20th Regt.
 Jebb, H. S. F., Lieut. late 3rd Hus.

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Jebb, J. de W., Major late 3rd Bn. Sco. Rifles.
 Jeffreys, P. D., Lt.-Col. late Conn. Rang.
 Jekyll, H., CMG., Major R.E.
 Jervois, J., Capt. R.E.
 Jervoise, E. P. E., Lieut. R.N.
 Jervoise, F. J. E., Dep.-Lt. of Hants
 Jocelyn, W. H., Comr. (retd.) R.N.
 Johnson, *Sir* Allen B., KCB., Lt.-Gen. Ben. S.C.
 Johnson, G. V., Lt.-Gen. late R.A.
 Johnson, W. S., late Lieut. 83rd Regt.
 *Johnston, W., MD., Surg.-Maj. M. S.
 *Johnstone, Charles, Capt. R.N. **GOLD**
Medallist, Naval Essay, 1884.
 Johnstone, H. C., CB., Maj.-Gen. late Ben. S. C.
 Johnstone, J. J., Maj.-Gen. late Gr. Gds.
 Jones, C. H. P., Lieut. R.N.
 Jones, D. F., Lt.-Col. late R.A.
 Jones, F. T., Major late 3rd Buffs
 Jones, G. T., Capt. R.E.
 Jones, H. M. T., Comr. R. N.
 Jones, Loftus F., Rear-Adm.
 Jones, M. Q., Capt. R. War. Regt.
 Jones, R. O., CB., Maj.-Gen. late R.E.
 Jones, T. E. A., Maj. Eng. Mil. Submarine Miners, R.E.
 *Josselyn, F. J., Lt.-Col. late 96th Regt.
 Justice, P., Major late R. Innis. Fus.

KANE, H. C., Capt. R.N.
 Keary, F. W., Lieut. R.N.
 Kelso, E. B. P., Comr. (retd.) R.N.
 Kelly, A. J., Capt. R.E.
 Kelly, W. F., Col. R. Sussex Regt.
 Kemball, G. V., Capt. R.A.
 Kennedy, J. D., Capt. late 4th Bn. Manch Regt.
 Kensington, E., Lt.-Col. late R.A.
 Kenyon-Slaney, W. R., Major Rif. Brig.
 Keppel, E. G., Lt.-Col. late Manch. Regt.
 Kerr, LORD F. H., Adm. (retd.)
 Kerr, LORD Walter Talbot, Rear-Adm.
 Kinahan, Richard G., Capt. R.N.
 King, Henry, Capt. (retd.) R.N.
 King, H. B., Capt. (retd.) R.N.
 King, Richard D., Capt. R.N.
 King, T. H., late H.E.I.C. Serv.
 Kingscote, Anthony, Capt. R.N.
 *Kintore, EARL of, GCMG., Major 3rd Bn. Gord. Highrs.
 Kitchener, H. E. C., Major D. of Corn. L.I.
 Kitson, G. C., Capt. K. R. Rif. C.
 Knight, H. R., Capt. E. Kent Regt.

LAFFAN, H. D., Capt. R.E.
 Laffan, J. de C., Lieut. R.E.
 Lake, B. G., Lt.-Col. 3rd Middx. R.V.
 Lamb, Henry, late Lieut. I. N.
 Lambert, C. J., MA., FRAS., Professor
 R.N. College, Greenwich
 Lambert, D. R., Lieut. R. E.

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Lambert, H. M., Sub-Lieut. R.N.R.
 Lambert, T., Capt. late R.A.
 Lance, F., CB., Col. Ben. S. C.
 Lang, E. L., Lieut. R.N.
 Lansdowne, MARQUIS of, GCMG.
 Lardner, Wm., late Lt. 2nd W. I. Regt.
 Lardy, C. F., Lt.-Col. late 53rd Regt.
 Law, C. H., Capt. Dorset. Regt.
 Law, E. D., Comr. (retd.) R.N.
 Lawrence, *Sir* A. J., KCB., Gen., Col. 1st Bn. Rif. Brig.
 Lawrence, F. E., Lieut. Rifle Bde.
 Lawrence, J. R., Capt. late I.N.
 Lawson, Robert, Insp.-Gen. Hospitals
 Lawson, H. M., Major R.E.
 *Layard, C. E., Maj.-Gen. late E. York. Regt.
 Leach, R. P., Capt. R.A.
 Leah, Henry, Comr. R.N.
 Leask, W., Major late 2nd Herts. R.V.
 Le Breton-Simmons, G. F. H., Lieut. R.E.
 Lee, J. H., late Lieut. S. Hants Mil.
 Leeds, The DUKE of, Major late North York Mil.
 Lees, E. B., Lt.-Col. late 22nd Lanc. R.V.
 Leigh, N. E. C., Lieut. late R.N.
 Le Messurier, A., CIE., Col. R.E.
 *Le Mesurier, F. A., Col. late R.E.
 Lennox, W. O., **U.C.**, CB., Lt.-Gen. late R.E.
 Lethbridge, W. P. C., Lieut. Gren. Gds.
 Leverson, G. F., Capt. R.E.
 Ley, J. M., Col.
 Liddell, *Hon.* Geo. A. F., Col.
 Lillingston, F. G. I., Capt. late 2nd Bde. Cinq. Ports Div. R.A.
 Lindsay, W. J., Lt.-Col. late Rif. Brig.
 Lindsell, J. B., Major R.E.
 Litteldale, H. W. A., Comr. R.N.
 Little, R. R., Capt. late Madras Art.
 Littledale, R. P., Capt. R.E.
 Littleton, *Hon.* Algernon C., Capt. R.N.
 *Lloyd, E., Major Ben. S.C.
 Lloyd, E. M., Lt.-Col. R.E.
 Lloyd, M., Capt.
 Lloyd, W., Lt.-Col. North Bengal R.V.
 Lloyd, W. C., Lt.-Col. late 20th Huss.
 Lloyd-Verney, G. H. Lt.-Col. 3rd Bn. Hamp. Regt.
 Lockhart, R. D. E., Lt.-Col. R.A.
 Lodder, W. W., Maj.-Gen. late 59th Regt.
 Loftus, D., late Lieut. Gr. Gds.
 Logan, A., Lt.-Col. R.A.
 *Long, Samuel, ADC., Capt. R.N.
 *Longstaff, L. W., Lt.-Col. late 1st E. York. R.V.
 Lorraine, *Sir* Lambton, *Bart.*, Capt. (retd.) R.N.
 Lovett, A. C., Lieut. 2nd Bn. Glouc. Regt.
 Low, C. R., late Lt. I. N.
 Lowe, F. M., Capt. R.A.
 Lowndes, J., Major late Royal Renfrew Militia
 Lowry, R. S., Comr. R.N.
 Loyd, A. P., Major late 21st Huss.
 Loyd, F. K., Lt.-Col. 3rd Bn. Ches. Regt.
 Lugard, *Rt. Hon.* *Sir* Edw., GCB., Gen., Col. E. Surrey Regt.

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Lumsden, H., Col. Lon. Scot. R.V.
 Lumsden, *Sir* Harry B., KCSI., CB., Lt.-Gen.
 late Ben. S. C.
 Lumsden, *Sir* P. S., GCB., CSI., Lt.-Gen.
 Ben. S. C.
 Luttmann-Johnson, F., Maj. York. & Lanc.
 Regt.
 Lyell, F. H., Capt. late 3rd Bn. Glouc. Regt.
 Lyon, N. J., Lieut. Gr. Guards.
 Lyons, T. C., CB., Maj.-Gen. late 87th Regt.
 Lysley, W. G., Major late Inns of Court R.V.
 Lytton, *The Right Hon.* EARL, GCB., GCSI.

M'CALL, S., late Lt. 5th Dr. Gds.
 McCallum, H. E., OMC., Capt. R.E.
 McCance, H. M. J., Lt. Rl. Scots. Regt.
 McCleverty, J., Col. 2nd Bn. Derby. Regt.
 McClintock, W., Lt.-Col. late R.A.
 *M'Donnel, C., Major late 4th R. I. Dr. Gds.
 MacFarlan, F. A., Lieut. Q.'s O. Cam.
 Highrs.
 MacFarlan, J. W., Lt.-Col. late 9th Lancers
 MacFarlan, W., Lieut. 2nd Bn. R. Highrs.
 M'Hardy, Wallace B., Comr. (retd.) R.N.
 McKinstry, F. G., Lieut. R.N.
 McLaughlin, Charles, Comr. (retd.) R.N.
 McMahon, N. R., Lieut. Rl. Fus.
 McMahon, *Sir* Thos. W., *Bart.*, CB., Gen.
 Col. 5th Drag. Gds.
 McNeile, Alex. Capt. late Indian Army
 McNeill, *Sir* J. C., *B.C.*, KCB., KCMG.,
 Maj.-Gen.
 *Maberly, E., CB., Maj.-Gen. late R.A.
 *Macaulay, G. W., Lt.-Col. late Bo. S. C.
 MacDonnell, A. C., DSO., Capt. R.E.
 Macdougall, A. H., late Roy. Archers of the
 Queen's Body Guard
 Macdougall, D. B., late Capt. 3rd Brig. Sco.
 Div. R.A.
 MacEachran, Dugald, Capt. late 1st Renfrew.
 R.V.
 MacGregor, M. J. R., Col. late Rl. I. Regt.
 Mackenzie, C. G., Lieut. R.A.
 *Mackenzie, C., Lt.-Col. late 3rd Bn. Seaf.
 Highrs.
 Mackenzie, R. S. M., Lt.-Col. late R.A.
 Mackeson, E., Dep.-Lieut. of Tr. Hamlets
 Mackinlay, G., Major late R.A.
 Mackirdy, D. E., Gen., Col. 2nd Bn. Welsh. R.
 *Maclean, H. J., Maj.-Gen. late Rif. Brig.
 Maclean, J. L., Capt. late 69th Regt.
 Maclear, J. F. L. P., Capt. R.N.
 Maconochie, Robert B., Comr. R.N.
 Mahon, H. J. P., late Lieut. 8th Huss.
 Mainwaring, K. H. A., Capt. (retd.) R.N.
 Maitland, E., CB., Col. late R.A.
 Maitland, F. T., Col. late R. S. Corps
 Malcolm, E. D., CB., Col. late R.E.
 Malcolm, H. H. L., Capt. Q.'O. Cam. Highrs.
 Malleson, G. B., CSI., Col. late Beng. S.C.
 Malby, G. R., Lieut. (retd.) R.N.
 *Man, Alex., Col. 3rd Bn. Gord. Highrs.
 Manchester, W. D., DUKE of, KP., Lt.-Col.
 late Huntingdonshire Lt. Horse Vols.
 Mann, G. F., Major R.E.
 Mann, Geo. R., Major 1st Middx. R. V.

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Mann, W. F. S., Capt. R.N.
 Mansel, J. C., Capt. late Northum. Mil.
 Mansfield, *Hon.* H. W., Lieut. 20th Hus.
 Mantell, A. M., Capt. R.E.
 Maquay, J. P., Maj.-Gen. late R.E.
 Mar and Kellie, EARL of, Lieut. Sco. Gds.
 Margary, A. R., Major late 54th Regt.
 Marker, R. J., Lieut. Colds. Gds.
 Markham, A. H., ADC., Capt. R.N.
 Markham, E., Maj.-Gen., D. A. Gen. R.A.,
 War Office.
 Marriott, R. C. E., Lieut. D. of Corn. L. I.
 Marshall, J. W., Major Marton R.V., N. Z.
 Marshall, L., Major Lan. Fus.
 Marshall, W., Dep.-Lieut. of Cumb.
 Marsland, W. E., Maj.-Gen. late 5th Dr.
 Gds.
 Martin, F. S., late Ens. 58th Regt.
 Martin, J. Harington, Comr. R.N.
 Martineau, G., late Lieut. 6th Surrey R.V.
 Mason, A. H. Capt. R.E.
 Mason, G., Capt. late 4th Foot
 Massy, W. G. D., CB, Maj.-Gen. late 5th
 Lancers.
 Mathias, V. D., Col. R. M. A. (retd.)
 Matthews, C. J., Col. late Middx. Regt.
 Matson, H., Major late 58th Regt.
 Maud, W. S., Lt.-Col. late R.E.
 Maude, G. E., Capt. 4th Bn. E. Surrey Regt.
 Maule, H. B., Maj.-Gen. late R.A.
 May, E. S., Capt. R.A.
 May, H. J., Capt. R.N.
 Maycock, S. M'M., Major R.E.
 Mayne, R. C., CB. M.P. Rear-Adm. (retd.)
 Mead, J. A. R., Col. late R.A.
 Meade, J. P., Capt. late Oxfordshire L. I.
 *Meaden, J., Lt.-Col. late 57th Regt.
 Mease, E., Capt. late H. A. C.
 *Mein, A. Major, late 4th Lanark R.V.
 Mellish, H., Capt. 4th V. Bn. Derbys. Regt.
 Mercer, C. H. L., late Lieut. R.A.
 Merceron, Henry, late H. A. C.
 Merewether, G. L. C., Col. R.E.
 Middleton, A. H., Capt. 3rd Bn. Arg. and
 Suth. Highrs.
 Miles, H. S. G., Lt.-Col. late R. Mun. Fus.
 Miller, *Sir* C. J. H., *Bart.*, Lt. Cold. Gds.
 Mills, R., Lt.-Col. Civil Service R.V.
 Mills, W., Lieut. Gren. Gds.
 *Milman, G. H. L., Maj.-Gen. late R.A.
 Milne, J., Dep.-Lieut. of Perthshire
 Milne, Archd. B., Comr. R.N.
 Milne, S. M., Major late 3rd W. Y. R. V.
 Mockler-Ferryman, A. F., Capt. Oxf. L. I.
 Molony, F. A., Lieut. R.E.
 Molyneux, A.M., Lt.-Col. late 2nd Mad. L.I.
 Molyneux, A. M., Capt. late 23rd R.W. Fus.
 *Molyneux, E., Lt.-Col. late 7th Dr. Gds.
 Monck, C. S. O., Lieut. Cold Gds.
 Monck, *Hon.* Henry P. C. S., Capt. late
 Cold. Gds.
 Monckton, J. H., Major 3rd Bn. N. Staff. R.
 Monckton, W. P., Major Hamps. Regt.
 Moncreiffe, *Sir* Robt. D., *Bart.*, Major 4th
 V. B. Rl. Highrs, late Lieut. Scots Gds.
 Moncrieff, *Sir*, C. C. S., KCMG., CSI., Col.
 late R.E.

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Monro, H. E., late Lieut. 2nd Bn. Oxf. L.I.
 Montagu, P., Capt. 12th Lancers
 Montgomerie, A. W. J., Col. late 20th Hus.
 Montgomerie, C. T. M., late Lieut. Gr. Gds.
 Montgomery, A. J., Major R.A.
 Montgomery, R. A., Major R.A.
 Moody, Thos. B., Nav.-Lieut. R.N.
 Moore, G. O., Comr. R.N. (retd.)
 Moore, J., Capt. late 30th Regt.
 Moore, J. G. C., late Lieut. R. Horse Gds.
 Moorhead, R. B., late Lieut. 12th Foot.
 Moreton, A. H. M., Lt.-Col. late Cold. Gds.
 Morrah, Jas. A., Col. late S. O. P.
 Morris, E., late Lieut. 54th Regt.
 Mortimer, H. M. J., Lt.-Col. late 73rd Regt.
 Morton, J. F., Col. late 2nd Bn. Bord. Regt.
 Mosse, W., Lt.-Col. late 1st Bn. Sco. Rif.
 *Mouat, F. J., FRCS., D.I.G. of Hosp.
 Mowbray, G. T., Major late 3rd Bn. Leic. Regt.
 Moysey, H. G., late Lieut. 11th Hussars
 *Murray, C. W., Col. late Glouc. Regt.
 Murray, Dennis, MD., Brig.-Surg.
 Murray, J. G., late Lieut. R.A.
 Murray-Aynsley, J. F., Lieut. R.N.
 Musgrave, H. E., Capt. 9th Lanc. A. Vols.
 Musgrave, *Sir* George, *Bart.*, Dep.-Lieut.
 Cumberland and Westmorland

NAIRNE, C. E., CB., Col. RA.
 Napier of Magdala, R. C. LORD, GCB.,
 GCSI., Field Marshal, R.E.
 Napier, *Hon.* J. P., Major 10th Huss.
 Napier, Robert A., Lieut. R.N.R.
 Napier, W. C. E., Gen., Col. K. O. Sco. Bord.
 Nash, E., Capt. R.A.
 Nathan, M., Capt. R.E.
 Naylor, Christopher J., Lieut. (retd.) R.N.
 Neal, W., Capt. late 52nd L. I.
 *Neave, E. S., Lt.-Col. late Beng. S. C.
 Needham, *Hon.* Edward T., Comr. R.N.
 Neele, T. C., late Mate R.N.
 Neish, F. H., Lieut. Gord., Highrs.
 Nelson, Horatio, Capt. (retd.) R.N.
 Netterville, A. J., late Lieut. 12th Regt.
 Neville, George, Comr. R.N.
 Neville, P. P., Lt.-Col. Hon. Corps Gentle-
 men-at-Arms
 Newark, C. W. S., Viscount, M.P., Major
 4th V. Bn. Derbys. Regt.
 Newdigate, F. A., Lieut. late Cold. Gds.
 Newmarch, Geo., Col. R.E.
 Newsome, W., Lt.-Col. late R.E.
 Newton, J. W. M., Capt. R.A.
 Nicholl, Edward, Lt.-Col.
 Nicholson, Henry F., CB., Rear-Adm.
 Nicholson, H. W., Capt. late 82nd Regt.
 Nicholson, J. A. S., late Lieut. Gr. Gds.
 Nicolls, J. H. E., Esq.
 Niven, W. D., FRS., Director of Studies,
 R. Naval Coll., Greenwich.
 Nixon, F. W., Lt.-Col. R.E.
 Noake, Maillard, Lt.-Col. New Zealand Mil.
 Noel, F. C. M., Lieut. R.N.
 Noel, G. H. U., Capt. R.N., **Gold Medallist**
Naval Essay, 1876
 Noel, *Hon.* E., Capt. Rifle Brigade

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Noel, Robt. L. G., Lieut. R.N.
 Nokes, J., Major late 65th Regt.
 Norman, W. H., late Mid. R.N.
 North, W., Col. R.E.
 Northbrook, *Right Hon.* EARL OF, GCSI
 Northland, George, Rear-Adml. (retd.) R.N.
 Norton, C. W., Capt. late 5th Lancers
 Norton, R. T. L., Capt. late 2nd L. Gds.
 Notman, H. W., Capt. late Lond. Scot. R.V.
 Nugent, J. V., Lt.-Col. late S. York. Regt.
 O'CALLAGHAN, G. W. Dougias, CB.,
 Adml. (retd.)
 O'Connor, J. T., Capt. late Cape M. Rifles
 Officer, C. M., Capt. Victorian Field Arty.
 Oldfield, G. T., Capt. late R. Lon. Mil.
 O'Leary, W. E., Capt. R. I. Rifles
 Ollivant, E. A., Major R.A.
 Olive, E. L., Capt. late S. Staff. Regt.
 Olpherts, R., Capt. late 1st W. I. Regt.
 Ommanney, E. A., Rev., Comr. (retd.) R.N.
 Ommanney, *Sir* Erasmus, *Kt.*, CB. FRS.,
 Adm. (retd.)
 Oswell, T. J., Lieut. R.N.
 Otway, C. W., late Mate R.N.
 Ouvry, H. A., CB., Col. late 9th Lancers
 Owen, J. F., Col. R.A.
 Oxley, Chas. L., Capt. R.N.

PAGET, H., Major 7th Huss.
 Paget, J., Capt. late Derby Mil.
 Palmella, DUKE of, late R.N.
 Papillon, A. F. W., Major late R.A.
 Parfitt, J. L., Lieut. R.N.R.
 Parker, J., Capt. late H.A.C.
 Parkin, T., MA., FRGS.
 Parkinson, F. F., Major A.P.D.
 Parr, Alfred A. C., Capt. R.N.
 *Parr, H. H., CMG., Col. late Som. L. I.,
ADC.
 Pasley, C., CB., M.-Gen. late R.E.
 Paterson, A. M. Major Bed. Regt.
 Paterson, W., Maj.-Gen. late 60th Rifles
 Paulet, LORD Wm., GCB., Field Marshal,
 Col. 1st Bn. Dur. L.I.
 Payne, E., Comr. R.N.
 Peach, H. P. K., Capt. late R. H. Gds.
 Peacocke, G. J., Lt.-Gen.
 Pearce, G. R., Capt. late Man. Regt.
 Peard, H., late Cornet 5th Dr. Gds.
 Pearson, M. B., Lt.-Col. 2nd Mid. Art. Vols.
 Pedder, H. N., Capt. late 3rd R. Lanc. Mil.
 Pelham, F. S., Lieut. R.N.
 Pelly, O., Lt.-Col. late Edm. Mil. Art.
 Pendarves, E. W. W., FRS., Lt.-Col. late R.
 Cornwall Rangers
 Pennell, R., Lt.-Col. late Northamp. Regt.
 Percivall, C., late Vet. Surg. R.A.
 Percy, LORD A. M. A., Major 3rd Bn.
 Northu. Fus.
 *Perrott, *Sir* Herbert C., *Bart.*, Lt.-Col.
 3rd Bn. E. Kent Regt.
 Perry, Ottley L., FRGS, FRHist.S., Capt.
 2nd V. Bn. L.N. Lan. Regt.
 Petit, L. P., late Mid. R.N.
 Phillimore, *Sir* Augustus, KCB., Adm. (retd.)

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Phillimore, Richard F., Lieut. R.N.
 Phillpotts, R. V., Capt. R.E.
 Pigot, J. H. S., FAS., Dep.-Lt. of Somerset
 *Pike, J. W., Rear-Adm. (retd.)
 Pilkington, H., Major R.E.
 Pinson, A., Lt.-Col. late 37th Mad. N. I.
 Pirie, George, Lieut. R.N.
 Pixley, S., late Capt. 1st Victoria R.V.
 Pitman, John C., Capt. (retd.) R.N.
 Plenderleath, C. W. M., Lieut. R.N.
 Pleydell-Bouverie, G., Capt. Cold. Gds.
 Plumer, H. C. O., Capt. York. & Lan. Regt.
 Pochin, N., Major R. Fus.
 Poignand, G., Major Leinster Regt.
 Poland, J. A., Rear-Adm. (retd.)
 Pollock, A. J. O., Major R. Sc. Fus.
 Ponsonby, Rt. Hon. Sir H. F., GCB., Gen.,
Private Secretary to Her Majesty
 Ponsonby, J. G., Major Royal Berks. Regt.
 Poole, W. H., Capt. late R.A.
 Poore, F. H., Lt.-Col. R. M. A.
 Poore, Richard, Comr. R.N.
 Poore, Robert, Major late 8th Huss.
 Porter, Basil, late Dep. Commissary
 Portland, the DUKE of, Col. Lanark. A. Vols.
 Povah, J. R., Major 2nd Bn. R. Dub. Fus.
 Powell, C. H., Capt. Ben. S. Corps
 Powell, W. W., Capt. late 86th Regt.
 Powis, E. J., EARL of, Lt.-Col. late Salop
 Yeoo.
 Powney, C. Du P. P., Lieut. Gren. Gds.
 Pratt, S. C., Lt.-Col. late R.A.
 *Prendergast, G. A., Col. Ben. S. C.
 Prendergast, Sir Harry N. D., *U.C.*,
 KCB., Gen. late R.E.
 Prendergast, T. J. W., Capt. R.E.
 Preston, D'Arcy S., Rear-Adm. (retd.)
 Preston, F. W. H., Capt. late 40th Middx. R.V.
 Preston, R., Col.
 *Prevost, James C., Adm. (retd.)
 Prevost, L. de T., Lt.-Col. late 2nd Bn.
 Arg. and Suthld. Highrs.
 Priaux, H. St. Geo., Capt. late K. O.
 Stafford Rifles
 Price, William, Army Agent
 Prickett, J. R., Comr. R.N.
 Primrose, George Anson, Comr. R.N.
 Pringle, J. Eliot, Capt. R.N.
 Prior, G. U., Col. late 2nd Bn. R. Scots.
 Purchas, J. R. P., Capt. S. Lan. Regt.

QUICK, Geo., Capt. late 1st R. Drs.

RADCLIFFE, Sir W. P., KCB., Gen.
 *Raikes, G. A., FSA., Lt.-Col. 3rd Bn.
 York. and Lanc. Regt.
 Raines, J. A. R., CB., Gen., Col. E. K. Regt.
 Rainsford-Hannay, F., Major R.E.
 Ramsay, F. F., Capt. Gord. Highrs.
 Ramsay, G. A., KH., Major
 Ramsden, Sir John W., *Bart.*, Col. 1st
 W. Rid. of Yorks. Art. Vols.
 Rason, E. G., Lieut. R.N.
 Ravenhill, A. H. D., Lieut. R.N.
 Ravenhill, F. G., Maj.-Gen. R.A.

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Ravenhill, P., CB., Maj.-Gen. late R.E.
 Rawlins, F. H., MA., FRGS., &c., Lieut.
 Roy. Ang. Eng. Mil.
 Rawlinson, Sir Henry C., GCB., FRS.,
 Maj.-Gen. late Bom. Army
 *Rawson, Harry H., CB., Capt. R.N.
 Reade, C. E., Comr. (retd.) R.N.
 Reay, C. T., Capt. Manc. Regt.
 Rebow, H. J. G., late Lieut. 2nd L. Gds.
 Reed, F., Capt. late R. Drs.
 Reeve, N. H., Capt. late 45th Regt.
 Rennie, Geo. B., late Mid. R.N.
 Renny, A. MacW., Capt. Ben. S.C.
 Renton, J., Lieut. late 2nd Lanarks. R.V.
 Reynardson, E. B., CB., Col. late Gr. Gds.
 Reynolds, H. C., Lt.-Col., late Durh. L.L.
 Rhodes, Godfrey, Col.
 Ricardo, H. G., Capt. R.A.
 Rice, Ernest, Capt. R.N.
 Rich, G. W. T., CB., Lt.-Gen.
 Richards, John C., Staff Comr. R.N.
 Richardson, J. B., Col. late R.A.
 Richardson, T., Capt. late 7th Huss.
 Richmond and Gordon, DUKE of, KG., Major
 late R.H. Gds.
 Ricketts, William, Lieut. R.N.
 Riddell, C. J. B., CB., Maj.-Gen. late R.A.
 Rigby, W. A., Lt.-Col. late 1st Lan. Eng. Vols.
 Risk, R. H. L., Lieut. R.N.
 Roberts, C. F., CMG., Col. N. S. W. Art.
 Roberts, Sir Fredk. S., *Bart.*, *U.C.*, GCB.,
 G.CIE., General
 Roberts, W. E., Lt.-Col. R. Fus.
 Robertson, C. G., late Lieut. L'pool Regt.
 Robertson, G. H., late 14th (P.W.O.) Regt.
 Robertson, W. J., Capt. R.A.
 Rochfort, A. N., Major R.A.
 Roe, C. H., Lieut. R.E.
 Rogers, J. P., Capt. late R.A.
 Rogers, T. R. Beechey, Paymaster R.N.
 Rooper, J., Capt. late Rifle Brig.
 Rosebery, EARL of, Col. 8th V.B. Loth.
 Regt. Dep.-Lieut. of Linlithgow
 Ross, E. F., late Lieut. 1st R. Sur. Mil.
 Ross, George, Major late R.E.
 Ross, J. J., Major late Som. L.I.
 Ross, J. T. C., FRCS., CIE., Surg.-Gen.
 late Ben. Med. Dep.
 Ross, T. C., Lieut. 2nd Bn. High. L. I.
 Ross, Walter T., Sub-Lieut. R.N.
 Rosseter, J. H., Major R.A.
 Rothwell, J. S., Lt.-Col. (h.p.) R.A.
 Routh, W. R., Major Suff. Regt.
 Rowley, Chas. J., Rear-Adm.
 Rudge, J., Col. Com. 10th Regtl. Dist., late
 Linc. Regt.
 Rundle, H. M. L., DSO. Lt.-Col. R.A.
 Russell, F. S., Col. (h.p.) late 1st R. Drags.
 Russell, H. R., Lt.-Col. late 1st Bn. Middx.
 Regt.
 Russell, LORD Herbrand A., late Lieut. Gr.
 Gds.
 Russell, Sir William, *Bart.*, CB., Lt.-Gen.

SACKVILLE-WEST, Hon. W. E., Lt.-Col.
 late Gren. Gds.

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St. John, C. W. R., Capt. R.E.
 St. John, *Hon.* Beauchamp M., late Lieut.
 74th Highrs., J.P. Co. Hereford
 St. John, *Sir* O. B. C., KCSI, Col. R.E.
 Salisbury, The MARQUIS of, K.G., Col. 4th
 Bn. Bedford Regt.
 Salmond, F. MacK., Major late R. Scots Fus.
 Saltmarshe, A., Col. late E. Surr. Regt.
 Saltren-Willett, A. J., Lieut. R.A.
 Sandbach, A. E., Capt. R.E.
 Sandeman, A. G., Major late C. Service R.V.
 Sandeman, G. G., Lt.-Col. 3rd Bn. R. Highrs.
 Sandeman, H. G. G., Sub-Lieut. R.N.
 Sanderson, P., Col. late 2nd Drs.
 Sandilands, E. N., Maj.-Gen. late Beng. S.C.
 *Sandys, H. Stair, Capt. (retd.) R.N.
 Sanford, G. E. L. S., CB, Col. (h.p.) R.E.
 Sapieha, J. P. A. PRINCE, late Lieut. 5th
 Dr. Gds.
 *Sargood, F. T., CMG., Lt.-Col. Victoria
 Field Art., Melbourne
 Satterthwaite, E., Major 2nd V.B. R. W.
 K. Regt.
 Saunders, A. W. O., Col. late 21st Fus.
 Saunders, F. W., Major 3rd Bn. Dorset. Regt.
 Saward, M. H., Col. R.A.
 Sawyer, W. H., Major N. Staff. Regt.
 Scarborough, EARL of, Capt. Drags. Yorks.
 Yeo., late Lieut. 7th Huss.
 Scott, John Binney, Capt. (retd.) R.N.
 Scott, J. G., Major late 4th Bn. E. Surr.
 Regt.
 Scott, J. R., Capt. late 4th Dr. Gds.
 Scott, William, Capt. late R.A.
 Scourfield, *Sir* Owen H. P., *Bart.*, Major
 late Pembrokehire Yeo.
 Scrivener, H. B., Capt. late Queen's Westr.
 R.V.
 Seale, F. R., FRGS., late St. Helena Regt.
 *Sewell, H. F. H., Col. Madras S.C.
 Sewell, S. A., Capt. late R. M. L. I.
 Seymour, H., Maj. late 23rd R. W. Fus.
 Seymour, W. H., CB, Gen., Col. 3rd Dr. Gds.
 Sharp, H. J., Major
 Sharp, W. G., Lt.-Col. late Mad. S. C.
 Sharpe, J. H., Col. late 55th Regt.
 Sharpe, Philip R., Rear-Adm. (retd.).
 Shaw-Stewart, J. H. M., Maj.-Gen. late R.E.
 Shawe, R. F., Major
 Shearman, John, Major
 Sheffield, J. C., Capt. late 21st R.N.B. Fus.
 Shelly, J. Nicholas, Surg. (h.p.) Greek L.I.
 Sherston, J., DSO. Capt. Rif. Brig.
 Shipley, Conway M., late Lt. R.N.
 Shipley, M. L., Capt. Ben. S.C.
 Shoolbred, W., Major Q.'s Westm. Rifle Vols.
 Short, H. M., Esq., late 17th Regt.
 Shrubbs, H. A. B., Sub-Lieut. R.N.
 Sibthorp, F. R. W., Col.
 Sieveking, F. S., Lieut. R.N.
 Sillery, Rob., MD., Staff Surg. (h.p.)
 Simmons, *Sir* J. Lintorn A., GCB., GCMG.,
 Gen. R.E.
 Simmons, T. C., late Hon. Corps of Gentle-
 men-at-Arms
 Sinclair, C. A., late Lt. 56th Regt.
 Slade, Edmund J. W., Lieut. R.N.

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Slater, H. M., Capt. R.A.
 Smith, C. H., late of Malta Dockyard
 Smith, David, McD., Lieut. (retd.) R.N.
 Smith, E. H., Capt. late 76th Regt.
 Smith, E. P., Lieut. R.A.
 Smith, G. R. F., Lieut. Cold. Gds.
 Smith, Philip, CB., Maj.-Gen. late Gr. Gds.
 Smith, W. H., *Right Hon.*, M.P.
 Smith, W. W. M., Major R.A.
 Smith-Bosanquet, H. J., Capt. late S. Herts
 Yeo.
 Smyth, George, Major
 Smyth, H. C. W., Major late Bengal Army
 Somers, LORD, Col., late R.A.
 Somerset, L. E. H., Adm.
 Somervail, A., late Ens. 1st Middx. R.V.
 Sparke, J. G., Major Yorkshire L. I.
 Sparks, E. T. B., Lt.-Col. 1st Bn. N. Staff. Regt.
 Sparks, J. B., Col. Beng. S. C.
 Spearman, A. Y. C. M., Lieut. R.N.
 *Spencer-Smith, Seymour, Capt. (retd.) R.N.
 Spencer-Stanhope, W., Lieut. 19th Hus.
 Spratt, A. G., Capt. Devon Regt.
 *Spratt, E. J. H., Major 1st Bn. Worc. Regt.
 Spratt, F. T. N., Capt. R.E.
 Spring, F. W. M., Col. R.A.
 Sprot, A., Capt. 6th Dr. Gds.
 Stace, H. C., Col. late R.A.
 Stanton, *Sir* Edward, KCMG., CB., Gen.
 R.E.
 Stanton, F. R., Capt. late 1st Royal Scots
 Staveley, *Sir* C. W. D., GCB., Gen., Col.
 Essex Regt.
 Steel, J. A., Maj.-Gen. late Ben. S. C.
 Stephenson, H. F., CB., ADC., Capt. R.N.
 Sterling, J. T., Lieut. Colds. Gds.
 Stevens, L. B., Lt.-Col. 3rd Middx. Art.
 Vols.
 Stevens, F. J. J., late Lieut. 1st Sur. R.V.
 Steward, E. H., CMG., Maj.-Gen. late R.E.
 Steward, H. H., Maj.-Gen. late 2nd Dr. Gds.
 Stewart, *Hon.* Alex., Maj.-Gen. late R.A.
 Stewart, Alex., Ordnance Storekeeper
 Stewart, Alex., Dep.-Lieut. of Norfolk
 Stewart, Duncan, Capt. late R.N.
 Stewart, H. B., Capt. R.N.
 Stewart, J. C., Capt. late 72nd Highrs.
 Stewart, M. J., MA., Lt.-Col. Ayr and Gall.
 Art. Vols.
 Stewart, Rich. H., War Office
 Stewart, Walter, Capt. R.N.
 *Stewart, W. L., Col. late 2nd Depot Battn.
 Stilwell, J. P., Esq., Navy Agent.
 Stirling, M., Roy. Archers of Scotland
 Stopford, A. B., Major R.A.
 Stopford, F. G., Lieut. R.N.
 Stopford, R. Fanshawe, Adm. (retd.)
 Stormont, W. D. Murray, VISCOUNT, Col.
 3rd Bn. R. Highrs.
 *Stotherd, R. Hugh, CB., Maj.-Gen. late
 R.E.
 Straghan, A., CB., Col. late High. L.I.
 Stuart, Donald, Major late 46th Regt.
 Stuart, H. C., Dep.-Lieut. of Bute,
 Stuart, J. F., Lieut. R.N.
 Stuart, W., Col. 3rd Bn. Bedf. Regt.
 Stuart, W. D., Capt. K. R. Rif. C.

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*Stubbs, F. W., Maj.-Gen. late R.A.
 Stuckey, W. L., Col. late Gr. Gds.
 Sturdee, F. C. D., Lieut. R.N., **Gold**
Medallist, Naval Essay, 1886
 Styan, Arthur, Capt. late Queen's W. Vols.
 Suffield, *Right Hon. LORD*, KCB., Col.
 Norfolk Arty. (E. Div. R.A.)
 Sullivan, *Sir Bartholomew J.*, KCB., Adm.
 (retd.)
 Sullivan, H., Col.
 Sutherland, A., Lieut. 1st Bn. Arg. & Suth'd.
 Highrs.
 Sutherland, The DUKE of, KG., Col. 11th
 Middx. R. V.
 Swan, Joseph, Lieut. R.N.
 *Sweny, Eugene, Admiralty
 Symes, W. A., Lt.-Col. late 1st Bn. High L.I.
 Symonds, R. J., Comr. R.N.
 Symonds, T. P., Lt.-Col. late Hereford Mil
 Symonds, T. G., late Lieut. 4th Dr. Gds.
 Syngé, M. H., Maj.-Gen. late R.E.

TABUTEAU, A. O., Lt.-Col. late 93rd
 Highrs.

Talbot, LORD E. B., Capt. 11th Hus.
 Talbot, F. A. B., Capt. Oxf. L. I.
 Tanner, *Sir O. V.*, KCB., Maj.-Gen. Bom. S.C.
 Target, A. T., Lieut. R.N.
 Taylor, A. H., Maj.-Gen. late 21st Huss.
 Taylor, W., Capt. late Middx. R.V.
 Teevan, A., late Lieut. 55th Regt.
 Teevan, G. J., Major late 94th Regt.
 Temple, C. P., DSO., Lt.-Col., 1st Bn.
 Berks. Regt.
 Tenison, Edward, Capt. late 14th Drs.
 Thackwell, Jos. E., CB., Gen.
 Theobald, C. B., Capt. R.N.
 Thompson, C. W., Gen., Col. 14th Huss.
 Thompson, E. R., late Lieut. 14th Drs.
 Thompson, L. C. F., Major L'pool R.
 *Thompson, R. T., Col. late Essex Regt.
 Thornburgh-Cropper, E. D., Capt. late Pem-
 broke Art. Mil.

Thresher, Wm., Comr. (ret'd.) R.N.
 Tillard, P. G., Lieut. R.N.
 Tingcombe, J. M., Lt.-Col. late 72nd Highrs.
 Tippinge, L. F. G., Lieut. R.N.
 Toke, J. L., Col. 1st V.B. Berks. Regt.
 *Tomkins, A. S., Capt. late Vict. Rifles
 Tomkyns, *Rev. John*, Capt. late R. Drs.
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 Townley, George, late Lt. Rifle Brig.
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 Trafford, H. T., Capt. late 43rd L. I.
 Travers, J. A., Major late 3rd Devons. R.V.
 Trent-Stoughton, H. W. J., Col. late 68th
 Regt.

Trevelyan, W. R., Lt.-Col. late Bom. S. C.
 Trueman, Fredk., Capt.
 Tryon, R., Capt. late Rifle Brigade
 Tryon, Robert, Adm. (ret'd.)
 Tubbs, Robert, Dep.-Lieut. of Middlesex
 Tumilty, J. S., Major late 1st Lanc. R.V.
 Turner, A. F., Lieut. R.N.
 Turnor, C. H., late Lieut. Rifle Brig.

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Turnour, *Hon. Keith*, Major K. R. Rif. C.
 Tylden, *Sir J. Maxwell*, Lt.-Col.
 Tyler, C. J., Maj.-Gen. late R.A.
 Tyler, Henry Edw., Capt. R.E.
 Tyler, *Sir H.W.*, KCB., Capt. late R.E., MP.
 Tyler, *Sir James*, late Lieut. of the Hon.
 Corps Gent.-at-Arms
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 Middx. R.V.

Utterson, Alfred, Maj.-Gen. late Bom. S. C.

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 Vander-Meulen, J. H., Major, Staff-Paym.
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Vivian, H. H. P., Capt. late 22nd Regt.

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 town Mil.

Walker, F. M., Lieut. R.N.

Walker, G. L., Capt. Arg. and Suthld.
 Highrs.

Walker, H. C. C., Major R.A.

Walker, J. S., Lt.-Col. late R. Highrs.

Walker, Mark, *W.C.*, CB., Lieut.-Gen.

Walker, P. F., Major late 23rd Middx. R.V.

Walker, R. S. F., Lt.-Col. late Glouc. Regt.

Wallace, C. T., Col. (h.p.) late 1st Bn. High.
 L. I.

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 Walter, *Sir Edward*, KCB., Capt. late 8th
 Huss.

Ward, W. R., Capt. late S. Down. Mil.

Wardrop, F. M., Col. 12th Lancers.

Warner, J. H., Lt.-Col. late 3rd Middx. R.V.

Warrand, W. E., Maj.-Gen. late R.E.

Warre, *Rev. E.*, DD., Col. 4th V. Bn. Oxf.
 L. I.

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 Watherston, E. J., Capt. late 22nd Middx. R.V.
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 Watkins, C. F., late Lieut. 2nd Drs.
 Watson, Sir J., *W.C.*, KCB., Lt.-Gen. Bom. S.O.
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 Wauchope, A. G., CB., C.M.G., Col. 1st Bn. R. Highrs.
 Webbe, G. A., Capt. late 15th Huss
 Webber, O. T. O'K., Lieut. R.E.
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 Welch, J. W., Capt. late H. A. C.
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 *Wilson, C. T., Major late 3rd Bn. Lan Fus.
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